LD5-TR and LE5-TR
Large Digit Ratemeter Totaliser Display
Operation and Instruction Manual

Table of Contents

1 Introduction

General description

This manual contains information for the installation and operation of the the LD5-TR Monitor. The instrument may be set to operate as a ratemeter or totaliser or allow toggling between rate and total displays. A "grand total" display is also viewable and can be separately reset. The **OPEr** function allows selection of one of these three modes. A brief description of each mode is given below. The "Explanation of functions" chapter details functions available for all modes, consult the separate function table for each mode to view the available functions for these modes.

The three modes of operation relevant to this manual selectable at the **OPEr** function are:

1. **totL** - totaliser/counter display. The input pulses are totalised, scaled in engineering units and displayed e.g. Total litres, mm etc. Count up or count down is possible. A total and grand total may be viewed and reset separately. The grand total is a separate total memory which allows storage of all the previous totals.

2. **rAtE** - frequency/rate display. The frequency or rate of the input may be scaled in engineering units and displayed e.g. R.P.M., Bottles/min., Litres/hour etc.. For low frequency inputs (input always below 1kHz) there is an option of displaying either rate or period. For frequencies below 1kHz there is a choice of displaying rate, averaged rate or period each of which are scaleable.

3. **both** - total/rate display (display may be toggled to either total or rate) This mode is primarily used when the display is required to toggle between a rate and total display via an external contact closure or via the front panel ▲ and ▼ buttons (only fitted on certain display options). For low frequency inputs (input always below 1kHz) there is an option of toggling between rate/total or period/total. A total and grand total may be viewed and reset separately.

Up/Down totalising

Input 2 can be set to control whether the pulses on input 1 cause the total to increase or decrease. The **inidir** display must be set to **UP.dn** for this input to be used. Input 2 type is configured by the **in 2** group of functions.

1.1 Selecting and altering access levels

This subsection details the use "access levels". Access levels can be used to obtain easy access to functions which are regularly required and to limit access to functions which are not required or which restricted access is required. These access level settings can be ignored if no restrictions to access are required and no easy access to selected functions is required.

Each setup function has a default access level allocated to it, for example the ascending alarm 1 function **AL.A 1** is allocated a default level of 2. There is a facility for the user to change the access levels for a limited number of functions to make them either easier to access or harder to access as required, see the **Fn.1CodE** function.

There are different ways of accessing setup functions, these are explained in the following section. Each mode allows a selection of access levels i.e. allows some choice of which functions are accessible.

The access levels available are:

None - no access to functions
1 - access to functions allocated to level 1

2 - access to functions allocated to level 2
3 - access to functions allocated to level 3
4 - access to functions allocated to level 4
5 - access to functions allocated to level 5
6 - access to functions allocated to level 6
CAL - access to all normal operation functions
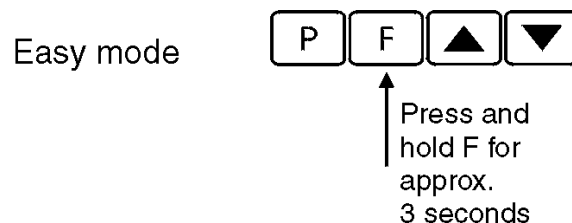
1.2 Accessing setup functions

The setup functions allow adjustment of the instruments operation functions. There are five different ways of accessing setup functions. Each mode allows a selection of access levels i.e. allows some choice of which functions are accessible.

As as summary the methods available are:

- **Easy mode** - this is the easiest access mode simply requiring the **F** button to be pressed for 3 seconds. This mode would normally be used to gain access to functions which require frequent adjustment.

- **Remote input mode** - this uses the Easy method of access but also requires the use of a remote input switch.

- **PIN 1 mode** - this method allows a PIN to be set with access via PIN entry.

- **PIN 2 mode** - this method also requires a PIN and would generally be use to allow a higher access level than the first PIN.

- **Super Cal mode** - this method requires a power up procedure and will allow access to all functions.

These modes are explained in more detail below.

- **Easy mode** - Allows access to the level set by the **EASYLEVL** function in the **ACCS** menu. By default the Easy access is set to **NONE** level i.e. no access.
  The Easy mode simply requires that the **F** button is held pressed until the message **FUNC** is seen followed by the first function message, this should take approximately 3 seconds. If the message **FUNC End** or no response is seen at this point it means that the access level has been set to **NONE**. The default access for this level is **NONE** so the access level will need to be changed if access via this method is required.

Easy mode

Press and hold F for approx. 3 seconds

- **Remote input mode** - Allows access to the level set by the **r.i NPLEVL** function in the **ACCS** menu. By default the Remote input access is set to **CAL** level allowing access to all setup functions. The remote input mode uses the same access method as the Easy mode but also requires that one of the available remote inputs is set to **ACCS** and that the selected remote input is activated i.e. shorted to GND. The default access for this level is **NONE** so the access level will need to be changed if access via this method is required.

Remote input mode

P F ▲ ▼

Press and hold F for approx. 3 seconds
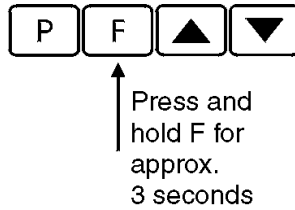
Also requires that the selected remote input is set to *ACCSS* and is activated.
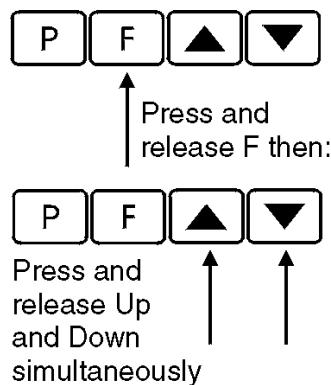
- **PIN 1 mode** - Allows access to the level set by the *USr. 1LEVL* function in the *ACCS* menu. The PIN 1 mode requires the **F** button is pressed and released then within 2 seconds press the ▲ and ▼ buttons at the same time. The PIN can be set via the *Pin. 1CodE* function in the *ACCS* menu. A *USr. 1LEVL* setting of *0* disables the PIN which means that there is no need to enter the PIN. If the *USr. 1LEVL* function has been set to a number other than *NONE* then the first function seen when entering via PIN 1 mode will be the function *CodE*. When this function is seen the PIN value set at the *USr. 1LEVL* function must be entered via the ▲ or ▼ pushbuttons followed by pressing **F** to accept the PIN before the user can progress to the setup functions.

PIN 1 and PIN 2 mode

P F ▲ ▼

Press and release F then:

If a PIN has been set the message *CodE* will be seen. Use ▲ or ▼ to enter the PIN then press **F** to accept the PIN.

P F ▲ ▼

Press and release Up and Down simultaneously

- **PIN 2 mode** - Allows access to the level set by the *USr.2LEVL* function in the *ACCS* menu. This method uses the same access method as PIN 1 mode above. A *Pin.2CodE* setting of *NonE* disables the PIN. If the *USr. 1LEVL* or a *USr.2LEVL* function has been set to a number other than *NonE* then the first function seen when entering via PIN 1/PIN2 mode will be the function *CodE*. When this function is seen the PIN value set at the *USr. 1LEVL* function can be entered for access to the level set at the *Pin. 1ACCS* function or enter the *USr.2LEVL* PIN to gain access to the level set at the *Pin.2 ACCS* function. A correct code will allow access to the functions at the selected level. An incorrect code will result in the *FUNC End* message being seen indicating that access to setup functions has been refused and the display will return to normal measurement mode.

- **Super Cal mode** - This method can be used to gain access to all functions. If a PIN has been set and forgotten use this method to access the PIN functions to check the settings. To access via Super Cal mode with the instrument switched off hold in the **F** button whilst the instrument powers up. Keep the button pressed until the *S.CAL* message is seen, you can then release the **F** button. Next press and release **F** then within 2 seconds press and release the ▲ and ▼ pushbuttons simultaneously.

Super Cal
mode

| P | F | ▲ | ▼ |

↑ Hold F when
powering up,
wait for **S.CAL**
message then:

| P | F | ▲ | ▼ |

↑ Press and
release F then:

| P | F | ▲ | ▼ |

Press and
release Up
and Down
simultaneously

The setup functions are organised in blocks or sections e.g. all the settings for channel 1 alarms are in the **AL 1** section. Once access to setup functions has been gained use the ▲ and ▼ buttons to select the section required then press **F** to enter this section and again us the ▲ and ▼ buttons to select the required function for alteration and press **F** to allow alteration of this function.

Typical sections for a basic instrument are illustrated below. In any particular instrument additional sections may appear depending on the part number and any optional outputs fitted.

```
                        ┌─────────────────┐
                        │   Alarm setup   │
                        │    functions    │
                        │   e.g. AL 1     │
                        └─────────────────┘
                                 ↕
                        ┌─────────────────┐
                        │   Relay setup   │
                        │    functions    │
                        │   e.g. rLY 1    │
Use ▲ or ▼ to move to   └─────────────────┘
the section required then        ↕
press F to access the   ┌─────────────────┐
functions in that section. │   Configure     │
Press P to escape the   │ functions e.g.  │
section you are in or   │     OPEr        │
press F at the End      └─────────────────┘
function in the section.         ↕
                        ┌─────────────────┐
                        │   Rate setup    │
                        │    functions    │
                        │  e.g. rAtEdCPt  │
                        └─────────────────┘
                                 ↕
                        ┌─────────────────┐
                        │   Total input   │
                        │ setup functions │
                        │    tot dCPt     │
                        └─────────────────┘
                                 ↕
                               etc.
```
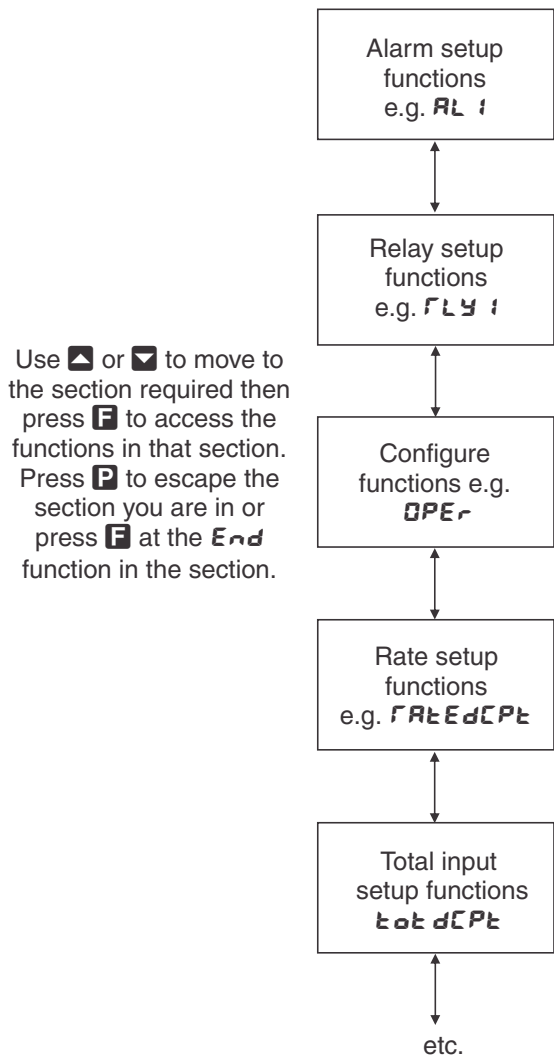
The example in the flowchart (for 4 digit display) below shows the method using alarm relay 1 setup function.

Alarm 2 setting section

AL 2 — Press **F** to go to

To go to back to measurement display press **P** or use ▲ or ▼ to go to **End** then press **F**

To scroll through to other main sections press ▲ or ▼

Use ▲ or ▼ to move between the alarm relay 1 settings

Settings for alarm 2

Hi gh — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to adjust to any setting or press ▲ and ▼ together to disable and set to **OFF**. Press **F** to accept the change.

Lo — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to adjust to any setting or press ▲ and ▼ together to disable and set to **OFF**. Press **F** to accept the change.

HYSt — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to adjust, range 0 to 9999. Press **F** to accept the change.

tri P — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to adjust, range 0.0 to 999.9. Press **F** to accept the change.

rSt — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to adjust, range 0.0 to 999.9. Press **F** to accept the change.

rLYS — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to choose the required relay then use **F** to select **On** or **OFF**. Use ▲ or ▼ to until **End** is seen. Press **F** to accept the change.

Ch — Followed by the setting — Press **F** to go to setting → Choose the channel **rAtE** or **totL**. Press **F** to accept the change.

Ltch — Followed by the setting — Press **F** to go to setting → Use ▲ or ▼ to choose **LAtch** or **Auto** Press **F** to accept the change.

End — Press **F** or **P** to return to the beginning of the section

Error and warning messages

A message of **-OF -** can mean that the value to be displayed is too large a positive or negative a number to be displayed i.e. a rate or total. If seen in a total display the total will have to be reset to zero or a preset value to return to normal display. This message can also be seen in circumstances described below.

The visual alarm setting for rate and total **rAtE diSP** and **tOt diSP** can be programmed to show visual warnings on the display of flashing the display value on and off or display shows **- - - -** or **-OF -** or **-UF -** or **-HI -** or **-LO -**. These warning messages indicate that the associated rate and/or total low and high limit values have been exceeded.

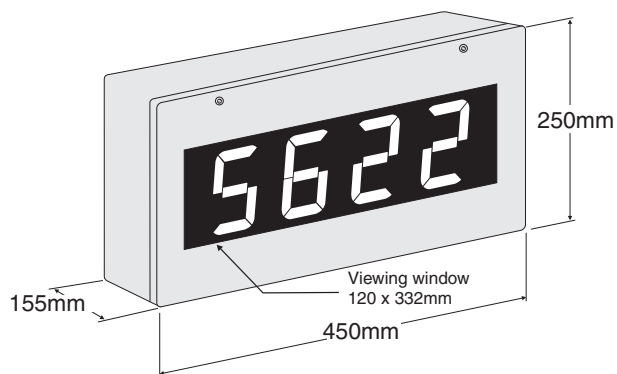# 2 Mechanical installation

2.1 20mm, 38mm, 45mm, 57mm and 58mm LED

An optional panel mount kit is available for these size displays. Panel cut out size is 240 x 130mm (-0.0mm / +0.5mm). Weight: All types 1.6kg approx.
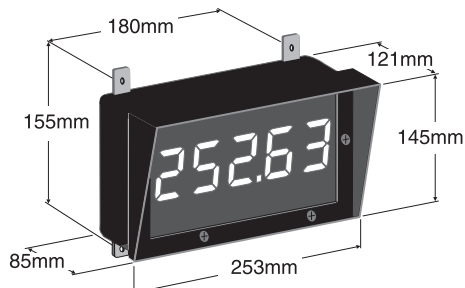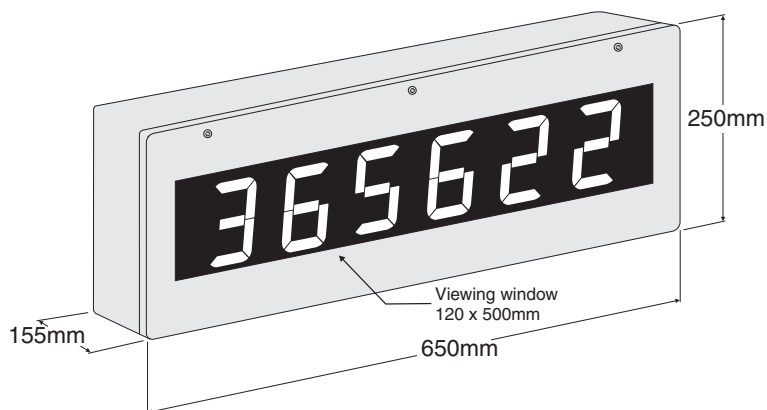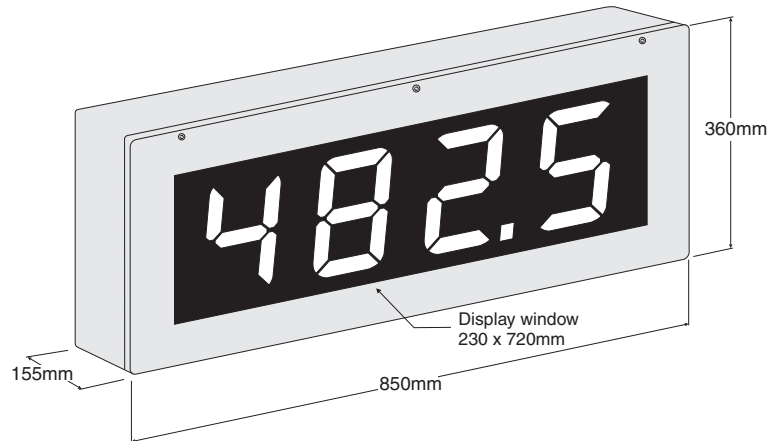

2.2 100mm 4 digit LED

Weight 10kg (LED)

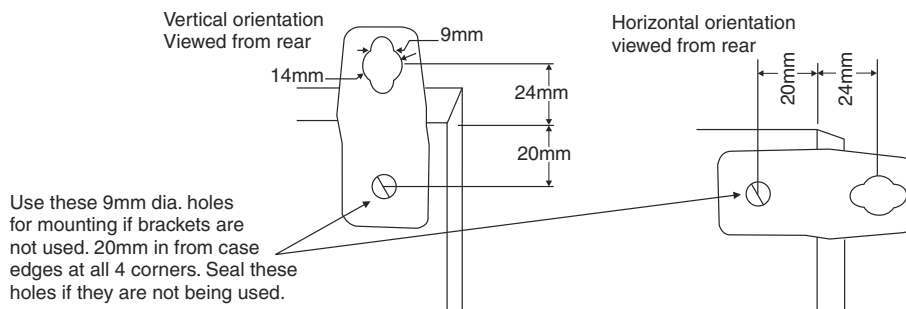## 2.3 100mm 6 digit LED

Weight 14kg (LED)

2.4   200mm 4 digit LED

Weight 14kg.

Display window
230 x 720mm

360mm

155mm

850mm

2.5   Cable entry and Mounting brackets

For 20 to 58mm displays no holes are pre drilled. For all 100mm and 200mm displays 3 off 20mm holes are drilled at the bottom of the case, these are fitted with 2 x IP65 grommets and 1 x air vent which allows moisture to exit the case but not enter. Four mounting brackets and four blind grommets are supplied for use with all metal case large digit displays. Diagrams below illustrate vertical and horizontal installation for mounting brackets. If mounting without the brackets is preferred then the 9mm dia. case holes provided for the brackets can be used as alternative mounting holes. Any rear holes not used for mounting should be sealed.

Vertical orientation
Viewed from rear

9mm

14mm

24mm

20mm

Horizontal orientation
viewed from rear

20mm

24mm

Use these 9mm dia. holes
for mounting if brackets are
not used. 20mm in from case
edges at all 4 corners. Seal these
holes if they are not being used.
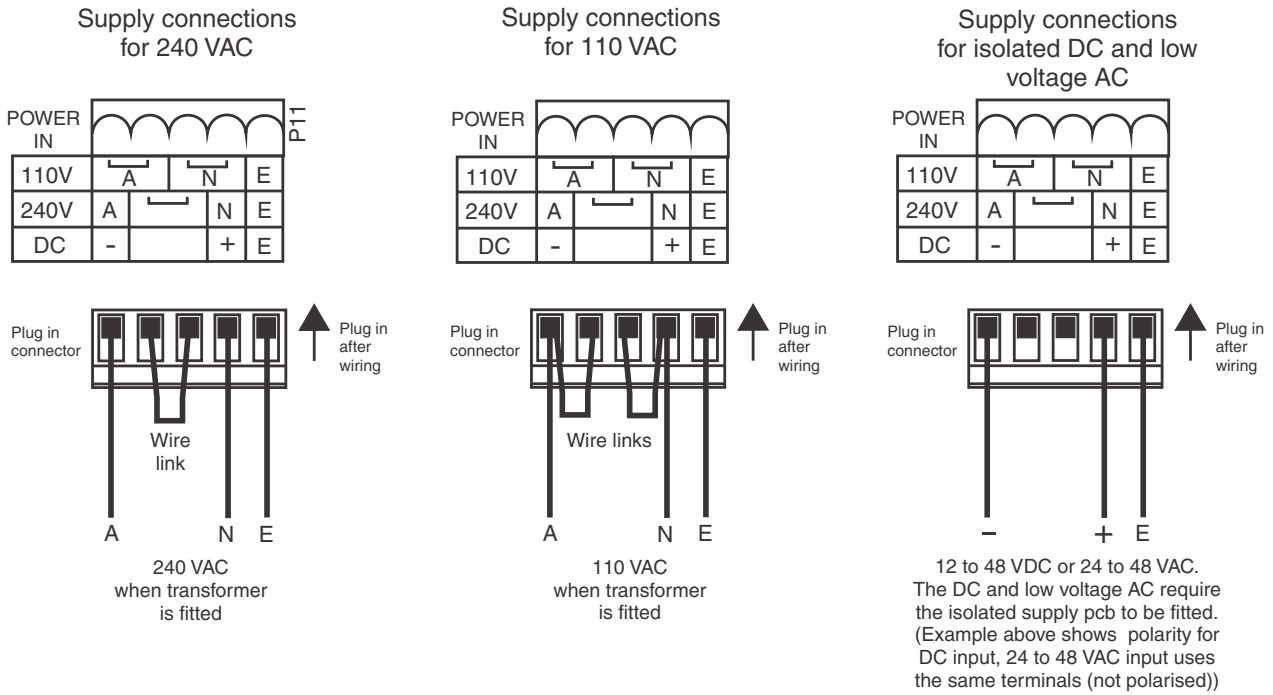
3   Electrical Installation

The display is designed for continuous operation and therefore no mains/power switch is fitted to the unit. It is recommended that an external switch and fuse be provided to allow the unit to be removed for servicing. To install cables remove six front panel retaining screws. Remove front panel taking care not to damage the ribbon cable (ribbon cable joins the front display circuit board to the main circuit board). Connect power and input cables to the plug in terminal blocks located within the enclosure. The terminals are clearly labeled and unplug for ease of installation, please take care to connect them correctly. The terminal blocks allow for wires of up to 2.5mm^2 to be fitted (relays and power) and 1.5mm^2 for inputs. When power is applied the instrument will cycle through a display sequence, indicating the software version and other status information, this indicates that the instrument is functioning.
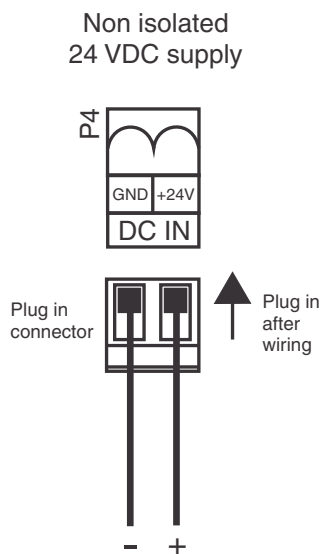
Input board layout
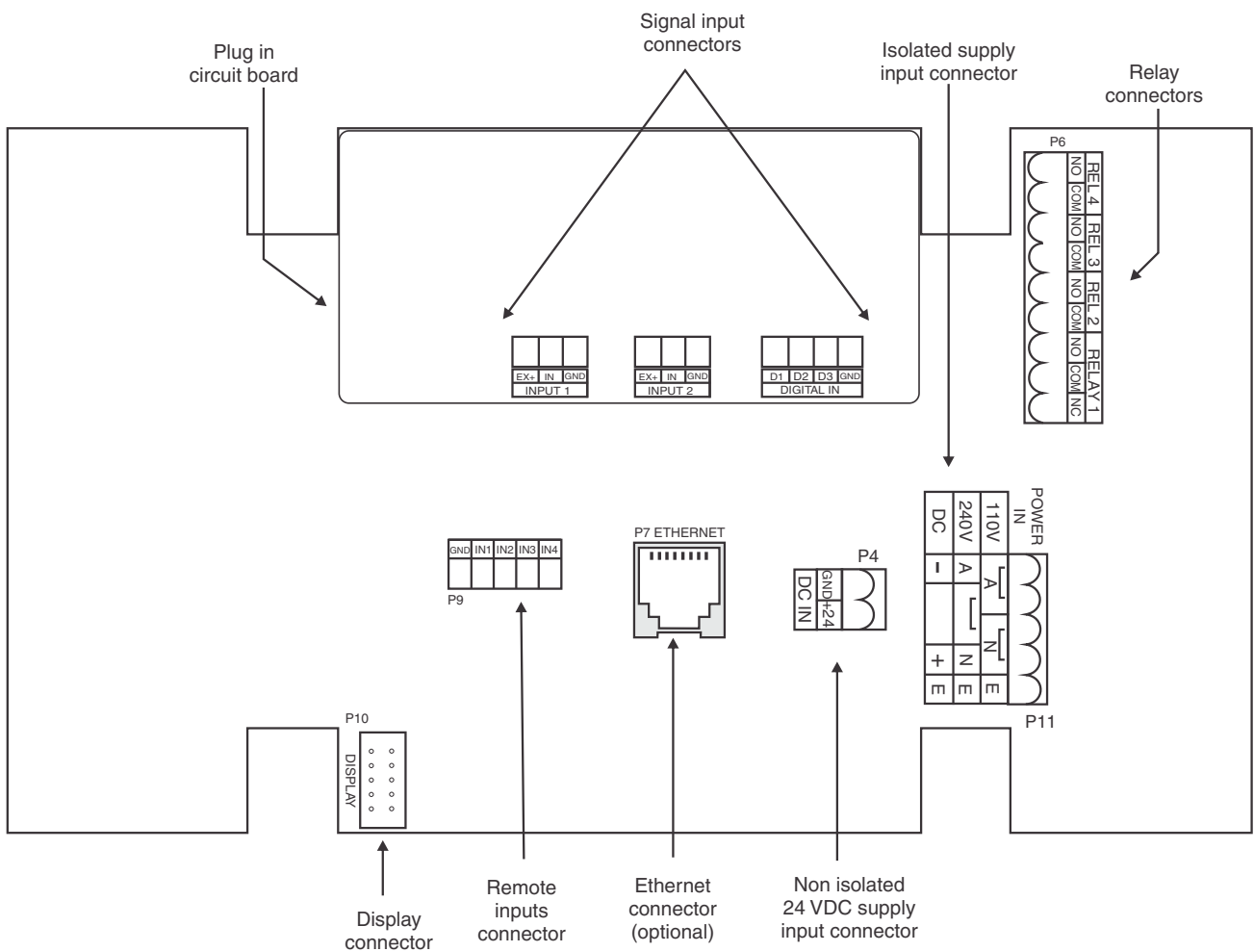
3.1 Power supply connections

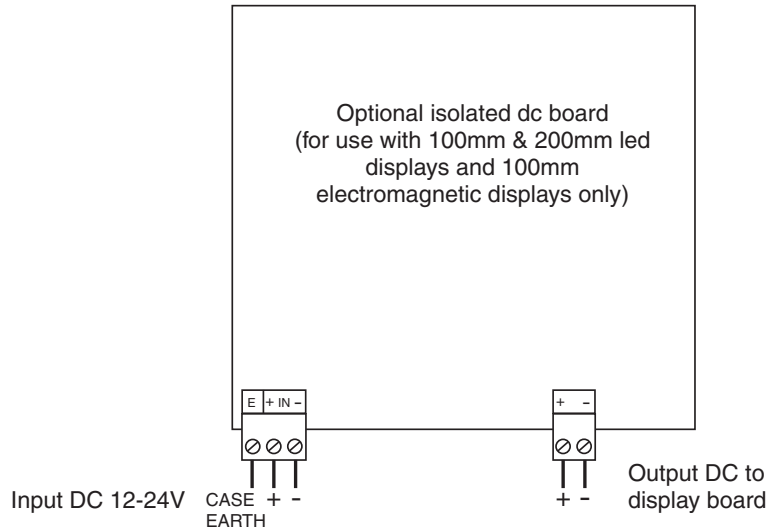## 3.2 AC supply or isolated DC supply (38, 45, 57 and 58mm displays only)

Supply connections
for 240 VAC

POWER IN				
110V	A	N		E
240V	A		N	E
DC	-		+	E

Plug in connector

Plug in after wiring

Wire link

A   N E

240 VAC
when transformer
is fitted

Supply connections
for 110 VAC

POWER IN				
110V	A	N		E
240V	A		N	E
DC	-		+	E

Plug in connector

Plug in after wiring

Wire links

A   N E

110 VAC
when transformer
is fitted

Supply connections
for isolated DC and low
voltage AC

POWER IN				
110V	A	N		E
240V	A		N	E
DC	-		+	E

Plug in connector

Plug in after wiring

−   + E

12 to 48 VDC or 24 to 48 VAC.
The DC and low voltage AC require
the isolated supply pcb to be fitted.
(Example above shows polarity for
DC input, 24 to 48 VAC input uses
the same terminals (not polarised))

3.3 Non isolated DC supply (38, 45, 57 and 58mm displays only)

Non isolated
24 VDC supply

GND	+24V
DC IN	

Plug in connector

Plug in after wiring

−   +

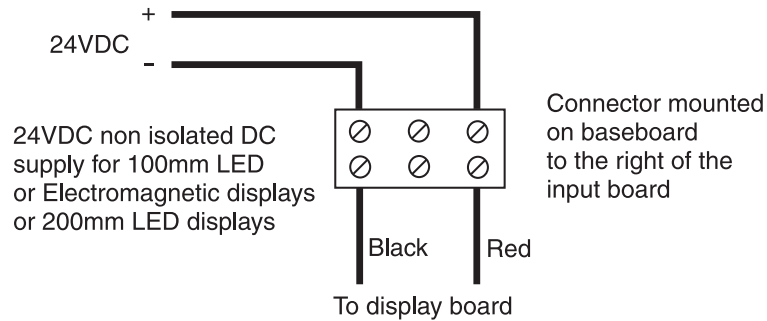## 3.4   100mm, 200mm LED and 100mm electromagnetic display power supplies

Isolated DC supplies (12 to 24VDC) connect to the isolated supply pcb on the base board. AC supplies connect to the transformer primary on the base board. The base board is located under the input circuit board.

Optional isolated DC supply (100 and 200mm displays only)

Optional isolated dc board
(for use with 100mm & 200mm led
displays and 100mm
electromagnetic displays only)

E + IN −

+ −

Input DC 12-24V   CASE + −
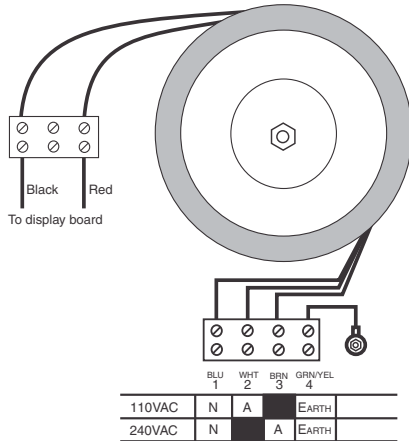EARTH

Output DC to
display board
+ −

Non isolated DC power supplies (100 and 200mm displays only)

Non isolated DC supplies (24VDC) are wired to a connector on the baseboard as shown below.

+
24VDC
−

24VDC non isolated DC
supply for 100mm LED
or Electromagnetic displays
or 200mm LED displays

Connector mounted
on baseboard
to the right of the
input board
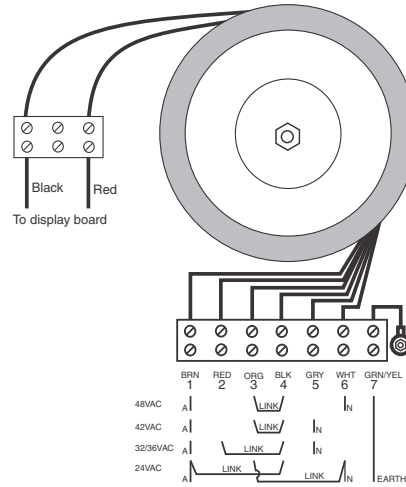
Black   Red

To display board

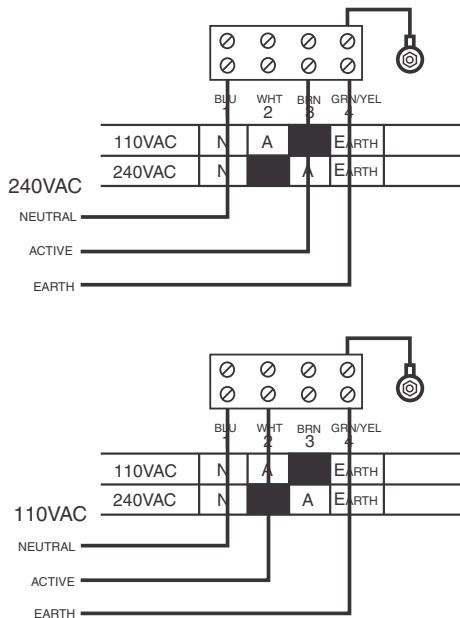**High and low voltage AC supplies (100 and 200mm displays only**

240 & 110VAC supplies.
For 100mm/200mm LED or 100mm
electromagnetic display types only.

Low voltage AC supplies.
For 100mm/200mm LED or 100mm
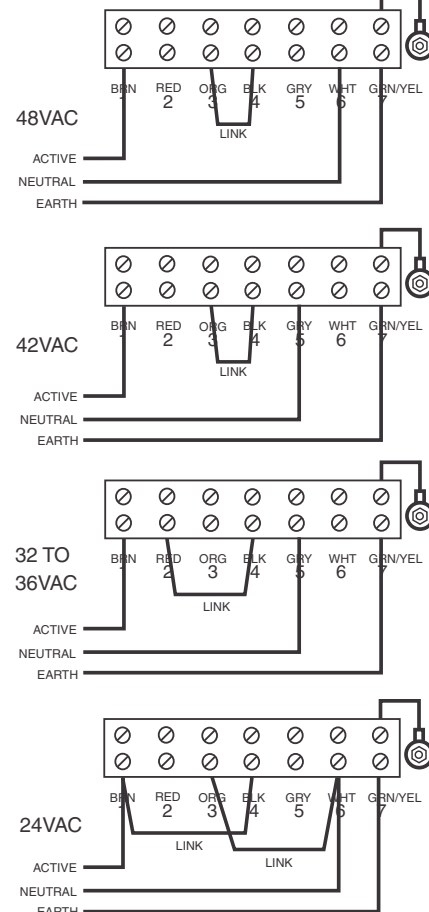electromagnetic display types only.

Black   Red

To display board

Black   Red

To display board

	BLU 1	WHT 2	BRN 3	GRN/YEL 4
110VAC	N	A		EARTH
240VAC	N		A	EARTH

	BRN 1	RED 2	ORG 3	BLK 4	GRY 5	WHT 6	GRN/YEL 7
48VAC	A		LINK			N	
42VAC	A		LINK			N	
32/36VAC	A		LINK		N		N
24VAC	A	LINK			LINK	N	EARTH

Wiring examples 240VAC & 110VAC

	BLU 1	WHT 2	BRN 3	GRN/YEL 4
110VAC	N	A		EARTH
240VAC	N		A	EARTH

240VAC
NEUTRAL
ACTIVE
EARTH

	BLU 1	WHT 2	BRN 3	GRN/YEL 4
110VAC	N	A		EARTH
240VAC	N		A	EARTH

110VAC
NEUTRAL
ACTIVE
EARTH

Important note: the 240V & 110V supplies use the same transformer, low voltage instruments use a different transformer. Do not use a low voltage transformer for 240V or 110V or vice versa.

Wiring examples low voltage AC

48VAC
BRN 1   RED 2   ORG 3   BLK 4   GRY 5   WHT 6   GRN/YEL 7
LINK
ACTIVE
NEUTRAL
EARTH

42VAC
BRN 1   RED 2   ORG 3   BLK 4   GRY 5   WHT 6   GRN/YEL 7
LINK
ACTIVE
NEUTRAL
EARTH

32 TO 36VAC
BRN 1   RED 2   ORG 3   BLK 4   GRY 5   WHT 6   GRN/YEL 7
LINK
ACTIVE
NEUTRAL
EARTH

24VAC
BRN 1   RED 2   ORG 3   BLK 4   GRY 5   WHT 6   GRN/YEL 7
LINK   LINK
ACTIVE
NEUTRAL
EARTH

3.5   Input connections

The display will accept many common input sensor types. The input circuit is configured by the **ı ɴ ı** and **ı ɴ2** functions. Input 1 is the rate/total pulse input and input 2 can be used to control if the pulses sent to input 1 will cause the total to count up or count down i.e Up/Down count control (requires **ᴛ0ᴛ dı ɾ** function to be set to **UP.dn**). The common input types together with typical **ı ɴ ı** settings for these inputs are given below.

Inductive sensor input

INDUCTIVE INPUT   LD5 TERMINALS
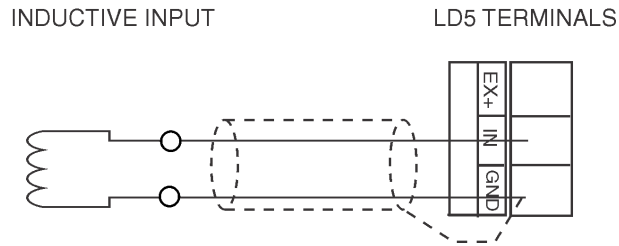
ını function settings settings for inductive input

- **PULL UP** Set to **Lo**

- **bıAS** Set to **OFF**

- **LoF** Set to **OFF**

- **HYSt** Set to **OFF** for very low amplitude inputs (25mV to 250mV) or **On** for inputs with amplitude 250mV to 48VDC or RMS

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **Ed9E** Select **Lo** (trigger from low going edge) or **Hı** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce

AC input

AC MEASUREMENT   LD5 TERMINALS
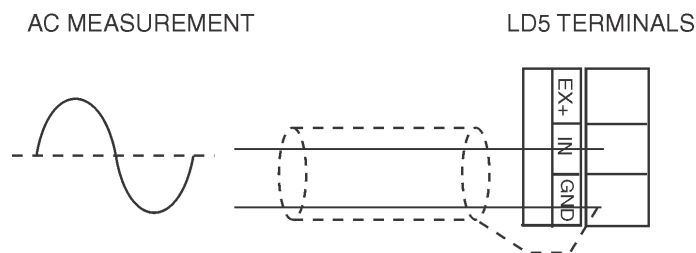
ını function settings settings for AC input

- **PULL UP** Set to **Lo**

- **bıAS** Set to **OFF**

- **LoF** Set to **OFF**

- **HYSt** Set to **OFF** for very low amplitude inputs (25mV to 250mV) or **On** for inputs with amplitude 250mV to 48VDC or RMS

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On** for input frequencies less than 10 Hz, otherwise set to **OFF**

- **Ed9E** Select **Lo** (trigger from low going edge) or **Hı** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce

Square wave input

SQUARE WAVE INPUT   LD5 TERMINALS
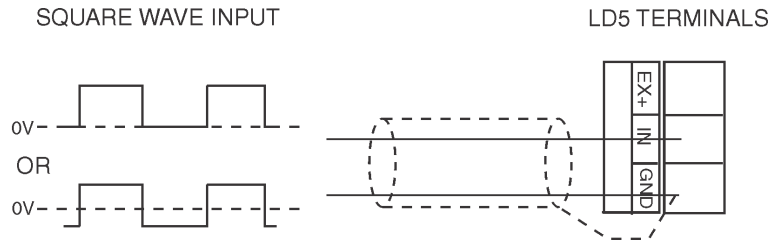
i n i function settings for square wave input

- **PULL UP** Set to **Lo**

- **bi AS** Set to **On** if signal is never negative polarity, otherwise set to **OFF**

- **LoF** Set to **OFF**

- **HYSt** Set to **OFF** for very low amplitude inputs (25mV to 250mV) or **On** for inputs with amplitude 250mV to 48VDC or RMS

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce
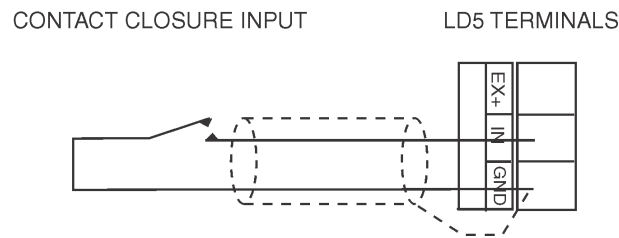
Contact closure input

CONTACT CLOSURE INPUT   LD5 TERMINALS

i n i function settings for contact closure input

- **PULL UP** Set to **Hi Gh**

- **bi AS** Set to **On**

- **LoF** Set to **On**

- **HYSt** Set to **On**

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce

Namur sensor input

NAMUR INPUT   LD5 TERMINALS
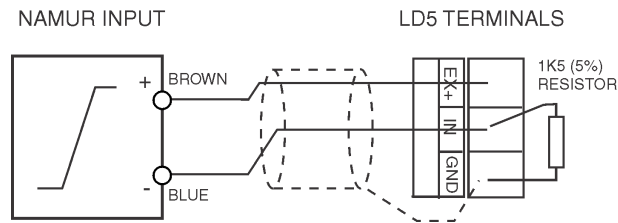
InI function settings for namur sensor input

- **PULL UP** Set to **Lo**

- **biAS** Set to **On**

- **LoF** Set to **OFF**

- **HYSt** Set to **On**

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce
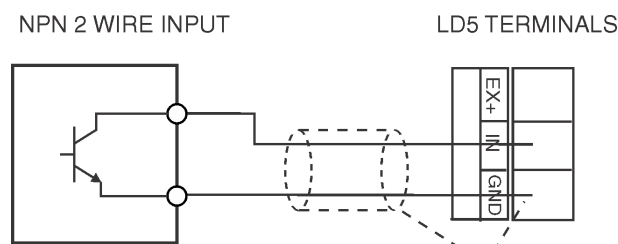
NPN 2 wire sensor input

NPN 2 WIRE INPUT   LD5 TERMINALS

InI function settings for NPN 2 wire sensor input

- **PULL UP** Set to **HiGh**

- **biAS** Set to **On**

- **LoF** Set to **OFF**

- **HYSt** Set to **On**

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce

NPN 3 wire sensor input

NPN 3 WIRE INPUT   LD5 TERMINALS

Ini function settings for NPN 3 wire sensor input

- **PULL UP** Set to **HiGh**

- **biAS** Set to **On**

- **LoF** Set to **OFF**

- **HYSt** Set to **On**

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce
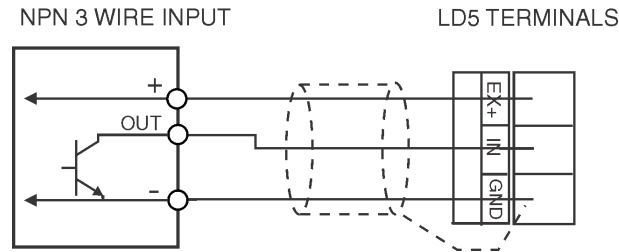
PNP 2 wire sensor input

PNP 2 WIRE INPUT   LD5 TERMINALS

Ini function settings for PNP 2 wire sensor input

- **PULL UP** Set to **Lo**

- **biAS** Set to **On**

- **LoF** Set to **OFF**

- **HYSt** Set to **On**

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce
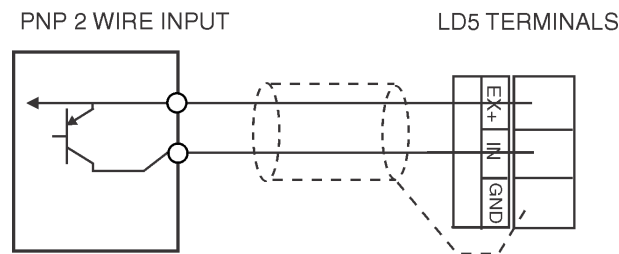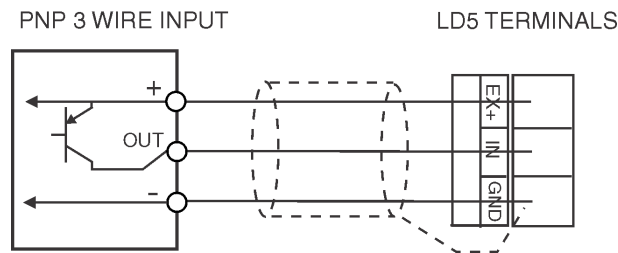
PNP 3 wire sensor input

PNP 3 WIRE INPUT   LD5 TERMINALS

In1 function settings for PNP 3 wire sensor input

- **PULL UP** Set to **Lo**

- **bIAS** Set to **On**

- **LoF** Set to **OFF**

- **HYSt** Set to **On**

- **Attn** Set to **OFF** for no attenuation or **On** to reduce the input amplitude by a factor of 5

- **dC** Set to **On**

- **EdGE** Select **Lo** (trigger from low going edge) or **Hi** (trigger from rising edge) as required

- **d.bnc** Normally only required for contact closure e.g. relay or switch input. Select a debounce time which allows operation without false triggering due to contact bounce

3.5.1 Remote/Digital inputs

The digital inputs will accept voltage free contact closure inputs or up to 24VDC signal. The electrical configuration for these inputs is configured by digital input functions, see the **d.in** section functions. The operation mode of the digital inputs are controlled by separate functions for each input, see the **r.inP** section functions. The electrical configuration for these inputs is configured by digital input functions, see the **d.in** section functions. Wiring example showing voltage free contacts below.

For reset and preset operation set the chosen remote input to **rSEt** or **P.SEt** as required.

LED for each input lights when input is active

GND IN1 IN2 IN3 IN4

Remote input connector

P9

Plug in after wiring

Latching or momentary switches can be used depending on the function selected.
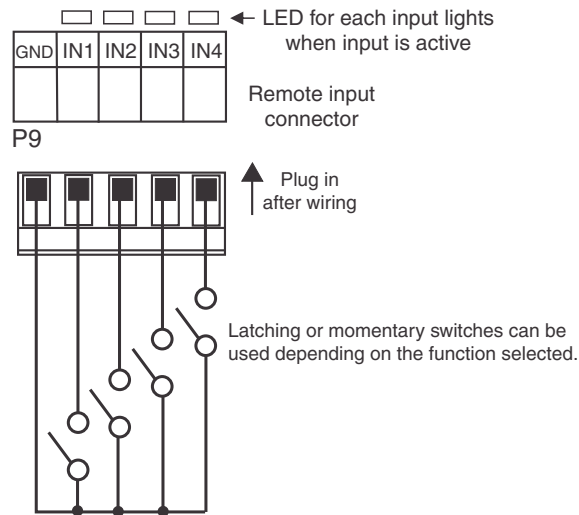
3.5.2 Input and Up/Down count terminals

The excitation voltage (can be set to 5, 12 or 18VDC if required) can be set at the **P.out** function. The Up/Down direction input is only used when the **in.dir** function is set to **UP.dn**. If input 2 is set for pull up then an open circuit on the direction will be count up when input 2 is open circuit and down when it is short circuit. If input 2 is set for pull down then an open circuit will cause the display to count down when it is open circuit and down when it is short circuit.

Input

Up/Down count

EX+	IN	GND
INPUT 1		

EX+	IN	GND
INPUT 2		
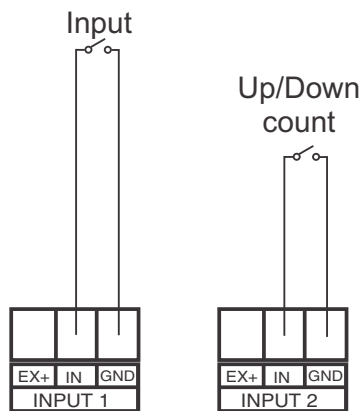
3.5.3 Relays

Relays are rated at 240VAC 5A into a resistive road. Relay 1 is form C type. Relays 2, 3 and 4 are form A type.
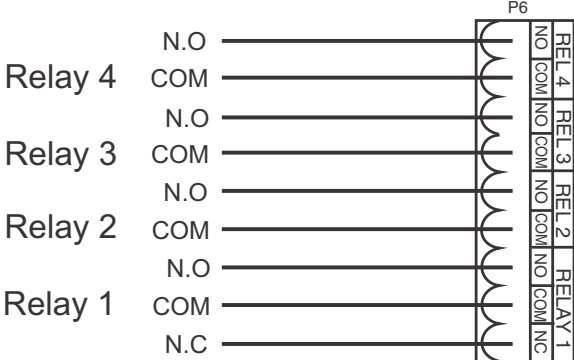
4 Function tables - summary of setup functions

Note: the order in which the functions appear on the display may not be exactly as shown below. The availability and order of functions is determined by choice of function settings and options fitted.

Actual messages seen on the display may vary slightly depending on the number of display digits.

Functions in this first table are available in **FUNC** or **CAL** mode.

4.1 Alarm function table

Display	Function	Range	Default	Your record	Ref/Page
AL 1 to **AL 8** **Hi.gh**	High setpoint value for designated alarm relay	Any display value or **OFF**	**OFF**	See 4.16	5.2 / 33
AL 1 to **AL 8** **Lo**	Low setpoint value for designated alarm relay.	Any display value or **OFF**	**OFF**	See 4.16	5.3 / 34
AL 1 to **AL 8** **HYSt**	Alarm relay hysteresis (deadband)	**0** to **65535**	**10**	See 4.16	5.4 / 34
AL 1 to **AL 8** **tri.P**	Trip time delay for the designated alarm relay	**0** to **6553.5** secs	**0.0**	See 4.16	5.5 / 35
AL 1 to **AL 8** **rSt**	Reset time delay for the designated alarm relay	**0** to **6553.5** secs	**0.0**	See 4.16	5.6 / 35
AL 1 to **AL 8** **P.Cnt**	Totaliser relay pass mode value	Any display value or **OFF**	**OFF**	See 4.16	5.7 / 36
AL 1 to **AL 8** **P.SEC**	Totaliser relay pass mode on time	**0.1** to **6553.5** secs	**0.0**	See 4.16	5.8 / 36
AL 1 to **AL 8** **rLYS**	Relay selection **On** or **OFF**	**On** or **OFF**	**OFF**	See 4.16	5.9 / 36
AL 1 to **AL 8** **OPEr**	Alarm relay operating mode	**Hi.Lo**	**Hi.Lo**	See 4.16	5.10 / 36
AL 1 to **AL 8** **Ch**	Alarm from rate or total	**rAtE** or **totL**	**rAtE**	See 4.16	5.11 / 37
AL 1 to **AL 8** **Ltch**	Alarm relay latching operation	**Auto, Ltch, A.b, L.b**	**Auto**	See 4.16	5.12 / 37

4.2 Relay function table

Display	Function	Range	Default	Your record	Ref/Page
⌐L 1 to ⌐L 8 ⌐L Y	Alarm relay *x* action to normally open (de-energised) or normally closed (energised)	n.o, n.c	n.o	See 4.16	5.13 / 37
⌐L 1 to ⌐L 8 Ac⌐	Relay acknowledge	OFF or On	OFF	See 4.16	5.14 / 38
⌐L 1 to ⌐L 8 bool	Alarm relay Boolean logic operation	Or, And	Or	See 4.16	5.15 / 38

4.3 Analog output function table

Display	Function	Range	Default	Your record	Ref/Page
⌐O 1 to ⌐O 2 OutP	Analog retransmission outputs (*Optional)	4-20, 0- 1.0, 0- 10	4-20		5.16 / 38
⌐O 1 to ⌐O 2 InPt	Analog retransmission input channel (*Optional)	⌐AtE or totL	⌐AtE		5.17 / 39
⌐O 1 to ⌐O 2 Lo	Analog retransmission low display value (*Optional)	Any display value	0		5.18 / 39
⌐O 1 to ⌐O 2 H.9h	Analog retransmission high display value (*Optional)	Any display value	1000		5.19 / 39

4.4 Operation mode function table

Display	Function	Range	Default	Your record	Ref/Page
OPEr CH 1 OPEr	Operation mode	⌐AtE, totL, both	⌐AtE		5.20 / 39
OPEr dFlt d.SP	Default display	⌐AtE or totL	⌐AtE		5.21 / 40

4.5 Ratemeter function table

Display	Function	Range	Default	Your record	Ref/Page
ᴦᴀᴛᴇ d.Pnt	Decimal point setting for ratemeter	0, 0.1, 0.02, 0.003	0		5.22 / 40
ᴦᴀᴛᴇ USEᴦ CAL	Rate display scaling method	InPt, USEᴦ, LIᴜE	InPt		5.23 / 40
ᴦᴀᴛᴇ InPt	Input value for ratemeter	1 to Maximum display value	1		5.24 / 41
ᴦᴀᴛᴇ SCL	Scale value for ratemeter	1 to Maximum display value	1		5.25 / 41
ᴦᴀᴛᴇ FLᴛᴦ	Ratemeter display filter	0, 1, 2, 3, 4, 5, 6, 7, 8	0		5.26 / 41
ᴦᴀᴛᴇ d.ᴦnd	Display rounding for ratemeter	1 to 5000	1		5.27 / 41
ᴦᴀᴛᴇ Lo diSP	Rate low value visual warning	Any display value or OFF	OFF		5.28 / 42
ᴦᴀᴛᴇ Hi diSP	Rate high value visual warning	Any display value or OFF	OFF		5.29 / 42
ᴦᴀᴛᴇ diSP	Warning message for low and high display	nOnE, FLSH, - - - -, Oᴦ.Uᴦ, Hi.Lo	nOnE		5.30 / 42
ᴦᴀᴛᴇ ᴦnɢE	Rate input range or mode	Lo.F, Hi.F, AUɢE, ᴦ.AUɢ	Hi.F		5.31 / 43
ᴦᴀᴛᴇ ᴛ.Out	Timeout for low frequency input	1 to 3200 secs	10		5.32 / 43
ᴦᴀᴛᴇ A.SEc	Time period for average rate display	1 to 5000 secs	1		5.33 / 44
ᴦᴀᴛᴇ A.cnt	Counts for average rate display	0 to 30	1		5.34 / 44
ᴦᴀᴛᴇ CAL In 1	Rate USEᴦ scaling mode frequency 1	Any display value	n/a		5.35 / 44
ᴦᴀᴛᴇ CAL SCL.1	Rate USEᴦ scaling mode scale 1	Any display value	n/a		5.36 / 45
ᴦᴀᴛᴇ CAL In 2	Rate USEᴦ scaling mode frequency 2	Any display value	n/a		5.37 / 45
ᴦᴀᴛᴇ CAL SCL.2	Rate USEᴦ scaling mode scale 2	Any display value	n/a		5.38 / 45
ᴦᴀᴛᴇ U.CAL	Rate LIᴜE scaling mode uncalibration	n/a	n/a		5.39 / 45

Display	Function	Range	Default	Your record	Ref/Page
⌐AtE CAL 1	Rate LIvE scaling mode input frequency 1	n/a	n/a		5.40 / 46
⌐AtE CAL2	Rate LIvE scaling mode input input frequency 2	n/a	n/a		5.41 / 46
⌐AtE OFSt	Rate LIvE display offset	n/a	n/a		5.42 / 46

4.6 Totaliser function table

Display	Function	Range	Default	Your record	Ref/Page
tOt d.Pnt	Decimal point setting for totaliser	0, 0.1, 0.02, 0.003	0		5.43 / 47
tOt iNPt	Input value for totaliser	1 to Maximum display value	1		5.44 / 47
tOt SCL	Scale value for totaliser	1 to Maximum display value	1		5.45 / 47
tOt d.rnd	Display rounding for totaliser	1 to 5000	1		5.46 / 48
tOt trnc	Truncation operation	trnc, rnd	trnc		5.47 / 48
tOt dir	Totaliser count up/down operation (*Optional)	UP, doun, UP.dn	UP		5.48 / 48
tOt 9.tot	Grand total operation mode	NonE, For, rEu, PoS, NE9, AbS	NonE		5.49 / 48
tOt Lo diSP	Total low value visual warning	Any display value or OFF	OFF		5.50 / 49
tOt Hi diSP	Total high value visual warning	Any display value or OFF	OFF		5.51 / 50
tOt diSP	Warning message for low and high display	NONE, FLSH, ----, Or.ur, Hi.Lo	NONE		5.52 / 50
tOt P.On r.SEt	Power on total reset	OFF, r.SEt, P.SEt	OFF		5.53 / 50
tOt 9t.On r.SEt	Power on grand total reset	OFF, r.SEt	OFF		5.54 / 51
tOt P.SEt	Total preset value	Any display value	0		5.55 / 51
tOt ⌐rAP OPEr	Wrap around operation	OFF, r.SEt, P.SEt, d.rAP	r.SEt		5.56 / 51
tOt r.uAL	Automatic reset wrap around value	Any display value or OFF	OFF		5.57 / 52

4.7   Inputs 1 (signal) and 2 (Up/Down) function table

Display	Function	Range	Default	Your record	Ref/Page
ı∩ı PULL UP	Input 1 pull up	OPEn, Hı9h, Lo	Hı9h		5.58 / 52
ı∩ı bıRS	Input 1 bias	OFF, On	On		5.59 / 52
ı∩ı LoF	Input 1 low frequency	OFF, On	OFF		5.60 / 52
ı∩ı HYSt	Input 1 hysteresis	OFF, On	OFF		5.61 / 53
ı∩ı Rttn	Input 1 attenuation	OFF, On	OFF		5.62 / 53
ı∩ı dC	Input 1 DC coupling	OFF, On	On		5.63 / 53
ı∩ı Ed9E	Input 1 input edge or level	Lo.E, Hı.E	Lo		5.64 / 54
ı∩ı d.bnc	Input 1 de-bounce timer	0 to 15 ms	0		5.65 / 54

4.8   Digital inputs trigger function table

Display	Function	Range	Default	Your record	Ref/Page
ı∩.d1 to ı∩.d3 Ed9E	Digital input edge or level selection	Lo, Hı, Lo.E, Hı.E, NonE	Lo		5.66 / 54
ı∩.d1 to ı∩.d3 d.bnc	Digital inputs 1, 3 and 3 de-bounce timer	0 to 1000 ms	0		5.67 / 55

4.9   Sensor supply function table

Display	Function	Range	Default	Your record	Ref/Page
P.Out P.Out	Output voltage selection	5U, 12U, 18U	5U		5.68 / 55

4.10   Remote inputs function table

Display	Function	Range	Default	Your record	Ref/Page

Display	Function	Range	Default	Your record	Ref/Page
r.ı ∏P *P.but*	Front P button operation mode	*∏O∏E, P.Hı , P.Lo, Hı .Lo, AL.Ac, rSEt, 9.rSt, PSEt*	*∏O∏E*		5.69 / 55
r.ı ∏P *r.ı ∏. 1*	Remote input 1 operation mode	*∏O∏E, P.HI d, d.HI d, P.Hı , P.Lo, Hı .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, duı I, rSEt, 9.rSt, StoP, PSEt*	*∏O∏E*		5.70 / 56
r.ı ∏P *r.ı ∏.2*	Remote input 2 operation mode	*∏O∏E, P.HI d, d.HI d, P.Hı , P.Lo, Hı .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, duı I, rSEt, 9.rSt, StoP, PSEt*	*∏O∏E*		5.71 / 57
r.ı ∏P *r.ı ∏.3*	Remote input 3 operation mode	*∏O∏E, P.HI d, d.HI d, P.Hı , P.Lo, Hı .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, duı I, rSEt, 9.rSt, StoP, PSEt*	*∏O∏E*		5.72 / 57
r.ı ∏P *r.ı ∏.4*	Remote input 4 operation mode	*∏O∏E, P.HI d, d.HI d, P.Hı , P.Lo, Hı .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, duı I, rSEt, 9.rSt, StoP, PSEt*	*∏O∏E*		5.73 / 57

4.11   Remote inputs configuration function table

Display	Function	Range	Default	Your record	Ref/Page
d.ı n *d.ı n. 1* *P.UP*	Remote input (digital inputs) 1 pull up/down operation	*OPEn, Hı 9h, Lo*	*Hı 9h*		5.74 / 58
d.ı n *d.ı n. 1* *Luı*	Remote input (digital inputs) 1 input level	*Hı 9h, Lo*	*Lo*		5.75 / 58

Display	Function	Range	Default	Your record	Ref/Page
d.in d.in.2 P.UP	Remote input (digital inputs) 2 pull up/down operation	OPEn, HiGh, Lo	HiGh		5.76 / 58
d.in d.in.2 LvL	Remote input (digital inputs) 2 input level	HiGh, Lo	Lo		5.77 / 59
d.in d.in.3 P.UP	Remote input (digital inputs) 3 pull up/down operation	OPEn, HiGh, Lo	HiGh		5.78 / 59
d.in d.in.3 LvL	Remote input (digital inputs) 3 input level	HiGh, Lo	Lo		5.79 / 59
d.in d.in.4 P.UP	Remote input (digital inputs) 4 pull up/down operation	OPEn, HiGh, Lo	HiGh		5.80 / 60
d.in d.in.4 LvL	Remote input (digital inputs) 4 input level	HiGh, Lo	Lo		5.81 / 60

4.12   Display function table

Display	Function	Range	Default	Your record	Ref/Page
diSP brGt Auto	Automatic display brightness	OFF or On	On		5.82 / 60
diSP brGt	Display brightness	1 to 63	63		5.83 / 61
diSP dull	Dimmed display brightness	0 to 63	7		5.84 / 61
diSP Auto HiGh	Auto display brightness high level	15 to 63	63		5.85 / 61
diSP Auto Lo	Auto display brightness low level	1 to 63	7		5.86 / 61

4.13   Serial comms function table

Display	Function	Range	Default	Your record	Ref/Page
SEri OPEr	Serial output operation mode (*Optional)	NONE, Cont, Poll, A.buS, diSP, n.buS, ChAn	NONE		5.87 / 62
SEri Ch	Serial operation channel (*Optional)	rAtE, totL or G.tOt	rAtE		5.88 / 62

Display	Function	Range	Default	Your record	Ref/Page
SErI bRud	Serial baud rate (*Optional)	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2	9600		5.89 / 63
SErI PrtY	Serial parity (*Optional)	8n, 8E, 8o, 7E, 7o	8n		5.90 / 63
SErI UnIt Rddr	Serial address (*Optional)	1 to 127	1		5.91 / 63
SErI Err dISP	Send error display	OFF or On	On		5.92 / 63

4.14 Alarm configuration function table

Display	Function	Range	Default	Your record	Ref/Page
RL.CF RL Cnt	Select number of alarms	0, 1, 2, 3, 4, 5, 6, 7, 8	2		5.93 / 64

4.15 Access function table

Display	Function	Range	Default	Your record	Ref/Page
RCCES ERSY LEuL	Easy access mode	nOnE, 1, 2, 3, 4, 5, 6, CRL	nOnE		5.94 / 64
RCCES r.I nP LEuL	Remote input access mode	nOnE, 1, 2, 3, 4, 5, 6, CRL	nOnE		5.95 / 64
RCCES USr.1 PIn	PIN code 1	0 to 65535	0		5.96 / 65
RCCES USr.1 LEuL	PIN code 1 access level	nOnE, 1, 2, 3, 4, 5, 6, CRL	nOnE		5.97 / 65
RCCES USr.2 PIn	PIN code 2	0 to 65535	0		5.98 / 65
RCCES USr.2 LEuL	PIN code 2 access level	nOnE, 1, 2, 3, 4, 5, 6, CRL	nOnE		5.99 / 66
RCCES Fn.1 CodE	User assignable access function 1	0000 to FFFF hex.	0000		5.100 / 66
RCCES Fn.1 LEuL	User assignable access 1 level value	dFlt, 1, 2, 3, 4, 5, 6, CRL, 5.CRL	dFlt		5.101 / 66

ACCES Fn.2 CodE	User assignable access function 2	0000 to FFFF hex.	0000		5.102 / 67
ACCES Fn.2 LEUL	User assignable access 2 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.103 / 67
ACCES Fn.3 CodE	User assignable access function 3	0000 to FFFF hex.	0000		5.104 / 67
ACCES Fn.3 LEUL	User assignable access 3 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.105 / 67
ACCES Fn.4 CodE	User assignable access function 4	0000 to FFFF hex.	0000		5.106 / 68
ACCES Fn.4 LEUL	User assignable access 4 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.107 / 68
ACCES Fn.5 CodE	User assignable access function 5	0000 to FFFF hex.	0000		5.108 / 68
ACCES Fn.5 LEUL	User assignable access 5 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.109 / 68
ACCES Fn.6 CodE	User assignable access function 6	0000 to FFFF hex.	0000		5.110 / 69
ACCES Fn.6 LEUL	User assignable access 6 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.111 / 69
ACCES Fn.7 CodE	User assignable access function 7	0000 to FFFF hex.	0000		5.112 / 69
ACCES Fn.7 LEUL	User assignable access 7 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.113 / 69
ACCES Fn.8 CodE	User assignable access function 8	0000 to FFFF hex.	0000		5.114 / 70
ACCES Fn.8 LEUL	User assignable access 8 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.115 / 70

4.16   Relay tables

Note: 4 relays are provided as standard - 4 extra relays are optionally available

Record your relay settings in the table below

Display	Alarm 1	Alarm 2	Alarm 3	Alarm 4	Alarm 5	Alarm 6	Alarm 7	Alarm 8
HiGh								
Lo								
HYSt								
triP								
rSt								
rLYS								
Ch								
Ltch								

Record which relays are allocated to which alarms and other relay settings in the table below

Display	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7	Relay 8
Alarm 1								
Alarm 2								
Alarm 3								
Alarm 4								
Alarm 5								
Alarm 6								
Alarm 7								
Alarm 8								
rLY								
Ack								
bool								

5   Explanation of functions

The setup and calibration functions are configured through a push button sequence. The push buttons located at the front of the instrument or on the main circuit board are used to alter settings.

Display messages shown are those which would appear on a display with 4 digits for the process reading, these display messages may in some cases vary slightly for other display types.

Note: default access levels for each function are shown in this section but the access levels are not applicable to this software version.

Explanation of Functions

5.1   Alarm relay high setpoint

Section:	**AL 1** to **AL 8**
Display:	**Hi gh**
Range:	Any display value or **OFF**
Default Value:	**OFF**
Default Access Level	**2**
Function number	**4000** to **4007**

Displays and sets the high setpoint value for the designated alarm relay. Use this high setpoint function if a relay operation is required when the display value becomes equal to or more than the low setpoint value.
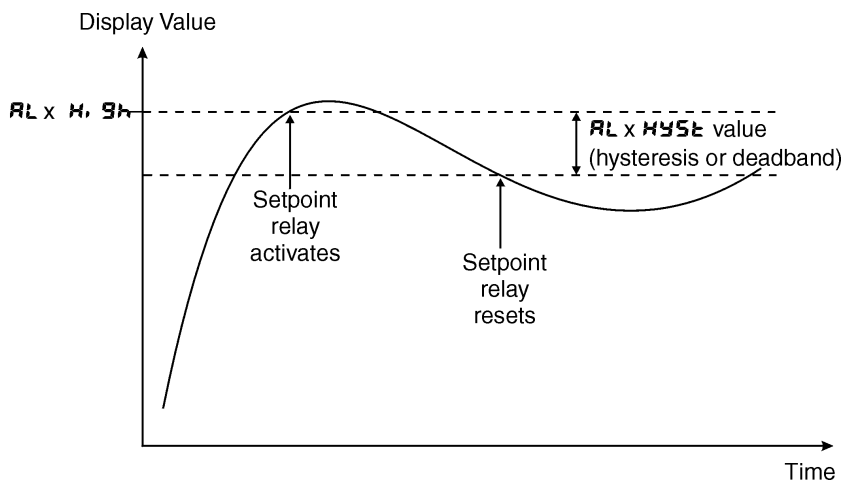
To set the high alarm value go to the **Hi gh** function, press **F** and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection. The high alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate **OFF**. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the **HYSt** function.

Overlapping alarms - if the **Hi gh** value is set lower than the **Lo** value then the alarm will activate in the band between the two values.

If the display has annunciator leds for the relay then the annunciator will initially flash in alarm condition, if the alarm is acknowledged by pressing the **F** button (where fitted) or has been acknowledged by a **P** button or remote input operation the annunciator will be solidly lit until the display moves out of alarm condition.

Example:
If **Hi gh** under **AL 1** is set to **100** then relay 1 will activate when the display value is **100** or higher.

Note if the high alarm value is set lower than the low alarm value the relay will activate between the two i.e. activate in the band between the two values.

5.2 Alarm relay high setpoint

Section:	**AL 1** to **AL 8**
Display:	**Hi gh**
Range:	Any display value or **OFF**
Default Value:	**OFF**
Default Access Level	**2**
Function number	**4000** to **4007**

Displays and sets the high setpoint value for the designated alarm relay. Use this high setpoint function if a relay operation is required when the display value becomes equal to or more than the low setpoint value.

To set the high alarm value go to the **Hi gh** function, press **F** and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection. The high alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate **OFF**. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the **HYSt** function.

Overlapping alarms - if the **Hi gh** value is set lower than the **Lo** value then the alarm will activate in the band between the two values.

If the display has annunciator leds for the relay then the annunciator will initially flash in alarm condition, if the alarm is acknowledged by pressing the **F** button (where fitted) or has been acknowledged by a **P** button or remote input operation the annunciator will be solidly lit until the display moves out of alarm condition.

Example:
If **Hi gh** under **AL 1** is set to **100** then relay 1 will activate when the display value is **100** or higher.

Note if the high alarm value is set lower than the low alarm value the relay will activate between the two i.e. activate in the band between the two values.

5.3   Alarm relay low setpoint

Section:	**AL 1** to **AL 8**
Display:	**Lo**
Range:	Any display value or **OFF**
Default Value:	**OFF**
Default Access Level	**2**
Function number	**4010** to **4017**

Displays and sets the low setpoint value for the designated alarm relay. Use this low setpoint function if a relay operation is required when the display value becomes equal to or less than the low setpoint value.

To set the low alarm value press **F** and when you see a digit of the value flash use the **▲** or **▼** push buttons to set the required value then press **F** to accept this selection.

The low alarm setpoint may be disabled by pressing the **▲** and **▼** push buttons simultaneously. When the alarm is disabled the display will indicate **OFF**. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the Hysteresis function.

If the display has annunciator leds for the relay then the annunciator will initially flash in alarm condition, if the alarm is acknowledged by pressing the **F** button (where fitted) or has been acknowledged by a **P** button or remote input operation the annunciator will be solidly lit until the display moves out of alarm condition.

Example:
If **Lo** under **AL 1** is set to **10** then relay 1 will activate when the display value is 10 or less.
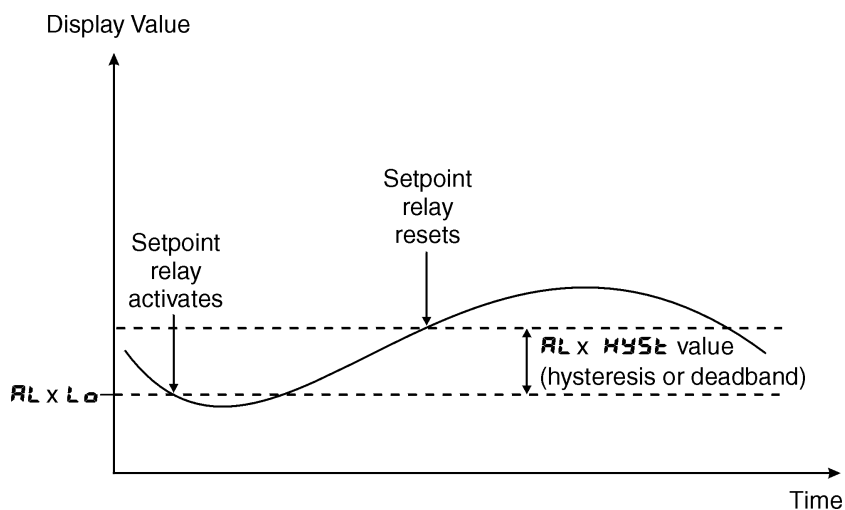
5.4   Alarm relay hysteresis (deadband)

Section:	**AL 1** to **AL 8**
Display:	**HYSt**
Range:	**0** to **65535**
Default Value:	**10**
Default Access Level	**3**
Function number	**4020** to **4027**

Displays and sets the alarm relay hysteresis limit for the selected channel. To set a relay hysteresis value go to the **HYSt** function and use the **▲** or **▼** push buttons to set the value required then press **F** to accept this value. The hysteresis value is common to Fault, Low and High setpoint values. The hysteresis value may be used to prevent too frequent operation of the relay when the measured value is rising and falling around setpoint value.

The hysteresis setting operates as follows: For the ascending alarms, once the alarm is activated the input must fall

below the setpoint value minus the hysteresis value to reset the alarm. e.g. if **AL 3 Hi 9h** is to **50.0** and **AL 3 HYSE** is set to **3.0** then the channel 4 alarm will activate once the display value goes to **50.0** or above and will reset when the display value goes below **47.0** i.e. at **46.9** or below.

For the descending alarms, once the alarm is activated the input must rise above the setpoint value plus the hysteresis value to reset the alarm. e.g. if **AL 2 Hi 9h** is to **0.0** and **AL 2 HYSE** is set to **10.0** then the channel 5 alarm will activate when the display value falls below **0.0** and will reset when the display value goes above **10.0** i.e at **10.1** or above. The hysteresis units are expressed in displayed engineering units.

5.5   Alarm relay trip time

Section:	**AL 1** to **AL 8**
Display:	**tri P**
Range:	**0** to **6553.5** secs
Default Value:	**0.0**
Default Access Level	**3**
Function number	**4040** to **4047**

Displays and sets the alarm trip time in seconds. The trip time is common for both alarm high and low setpoint values. The trip time provides a time delay before the alarm relay will activate when an alarm condition is present. The alarm condition must be present continuously for the whole trip time period before the alarm will activate. If the input moves out of alarm condition during this period the timer will reset and the full time delay will be restored. This trip time delay is useful for preventing an alarm trip due to short non critical deviations from setpoint. The trip time is selectable over **0.0** to **6553.5** seconds.

To set the trip time value go to the **tri P** function, press **F** and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection.

Example: If **tri P** is set to **5.0** seconds then the display must indicate an alarm value for a full 5 seconds before the relay will activate.

5.6   Alarm relay reset time

Section:	**AL 1** to **AL 8**
Display:	**rSt**
Range:	**0** to **6553.5** secs
Default Value:	**0.0**
Default Access Level	**3**
Function number	**4050** to **4057**

Displays and sets the alarm reset delay time in seconds. The reset time is common for both alarm high and low setpoint values. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. If the input moves back into alarm condition during this period the timer will reset and the full time delay will be restored. The reset time is selectable over **0.0** to **6553.5** seconds.

To set the reset time value go to the **rSt** function, press **F** and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection.

Example: If **rSt** is set to **10.0** seconds then the resetting of alarm relay will be delayed by 10 seconds.

5.7 Totaliser relay pass mode value

Section:	AL 1 to AL 8
Display:	P.Cnt
Range:	Any display value or OFF
Default Value:	OFF
Default Access Level	4
Function number	4180 to 4187

When the alarm operation is set to operate from the total display value the "Pass" mode operation option becomes available. In pass mode a value can be set and a relay or relays can be set to activate at multiples of this value. The time duration of the relay activation is set at the **P.SEC** function which follows. For example if the **P.Cnt** function is set to 100 and the **P.SEC** function is set to 2.0 then the associated relays will activate for 2 seconds at total display values of 100, 200, 300 etc.

5.8 Totaliser relay pass mode on time

Section:	AL 1 to AL 8
Display:	P.SEC
Range:	0.1 to 6553.5 secs
Default Value:	0.0
Default Access Level	4
Function number	4190 to 4197

This function sets the time in seconds for which the "Pass" mode relays will activate. See the **P.Cnt** function.

5.9 Relay selection

Section:	AL 1 to AL 8
Display:	rLYS
Range:	On or OFF
Default Value:	OFF
Default Access Level	4
Function number	4330 to 4337

Allows a relay to be allocated to an alarm. For example if a high alarm value has been selected at the **AL 1 Hi9h** function this alarm could be allocated to relay 3 by selecting **rLY3 On** at this function. Press the 🄵 button to enter this function then use the 🔼 or 🔽 pushbuttons to choose the required relay then press the 🄵 button to toggle to **On** or **OFF** as required. When relay PI control is used alarm 1 is dedicated to relay 1 and alarm 2 is dedicated to relay 2 so no selection choice will appear when set for PI control.

5.10 Alarm relay operating mode

Section:	AL 1 to AL 8
Display:	OPEr
Range:	Hi.Lo
Default Value:	Hi.Lo
Default Access Level	4
Function number	4160 to 4167

Sets the operating mode for the selected relay, refer to "Setting up the relay PI control" chapter in the Addendum booklet.

5.11 Alarm from rate or total

Section:	**AL 1** to **AL 8**
Display:	**Ch**
Range:	**rAtE** or **totL**
Default Value:	**rAtE**
Default Access Level	**4**
Function number	**4070** to **4077**

Allows selection or alarm operation from the rate value or the total value.

5.12 Alarm relay latching operation

Section:	**AL 1** to **AL 8**
Display:	**Ltch**
Range:	**Auto**, **Ltch**, **A.b**, **L.b**
Default Value:	**Auto**
Default Access Level	**4**
Function number	**4170** to **4177**

Allows selection of alarm latching operation. If set to **Auto** the alarm relays will not latch i.e. they will automatically reset when the display moves out of alarm condition. If set to **Ltch** the relay will latch and will not reset until the display value is out of alarm condition and either the **F** button is pressed to clear the latch condition or if power is removed. The relay hysteresis, trip time and reset time settings still apply to latching relays.

In latching mode the alarm annunciator (if annunciators are fitted) will flash when the display goes into alarm condition. If the display goes out of alarm condition without being acknowledged the flashing period will change to give a longer "off" time. If the alarm is acknowledged by pressing the **F** button then the annunciator will change from flashing to solidly lit. Once the alarm has been acknowledged the relay will be free to reset once the display value moves out of alarm condition.

5.13 Alarm relay normally open/closed

Section:	**rL 1** to **rL 8**
Display:	**rLy**
Range:	**n.o**, **n.c**
Default Value:	**n.o**
Default Access Level	**4**
Function number	**4030** to **4037**

Displays and sets the setpoint alarm relay *x* action to normally open (de-energised) or normally closed (energised), when no alarm condition is present. Since the relay will always open when power is removed a normally closed alarm is often used to provide a power failure alarm indication. To set the alarm relay for normally open or closed go to the **rL 1** to **rL 8 rLy** function and use the **▲** or **▼** push buttons to set the required operation then press **F** to accept this selection. **Example:**
If set to **A 1n.o** alarm relay 1 will be open circuit when the display is outside alarm condition and will be closed (short circuit across COM and N/O terminals) when the display is in alarm condition.

5.14   Relay acknowledge

Section:	$\Gamma L\,I$ to $\Gamma L\,B$
Display:	$A c\bar{h}$
Range:	OFF or On
Default Value:	OFF
Default Access Level	4
Function number	4320 to 4327

If an alarm has been set to latching operation it will not reset until the reading is outside its alarm condition and the operator has acknowledged the alarm by pressing the **F** button (where fitted) or when programmed for this purpose using a **P** button or remote input to acknowledge the alarm. If the $Ac\bar{h}$ is set to On the operator can acknowledge the alarm whilst still in alarm condition allowing the alarm to reset automatically when the reading moves outside the alarm condition.

5.15   Alarm relay Boolean logic operation

Section:	$\Gamma L\,I$ to $\Gamma L\,B$
Display:	$bool$
Range:	Or, And
Default Value:	Or
Default Access Level	4
Function number	4310 to 4317

This function allows a Boolean logic AND (And) or OR (Or) function to be applied to alarms. If two or more alarms use the same relay and that relay is set to operate as an OR operation then this effectively puts the alarms in parallel. If two or more alarms use the same relay that relay is set to operate on an AND operation then this effectively puts the alarms in series.

Examples: 1. If alarms 1, 2 and 3 all use relay 1 and relay 1 is set for Or operation then relay 1 will activate if the display value for the selected channels for these alarms causes either alarm 1 or alarm 2 or alarm 3 to go into alarm condition. i.e. relay 1 will activate if any of the alarms is in alarm condition.

2. If alarms 1, 2 and 3 all use relay 1 and relay 1 is set for And operation then relay 1 will activate if the display value for the selected channels for these alarms causes alarm 1 and alarm 2 and alarm 3 to go into alarm condition. i.e. all 3 alarms must be in alarm condition for relay 1 to activate.

5.16   Analog retransmission outputs

Section:	$\Gamma O\,I$ to $\Gamma O\,2$
Display:	$OutP$
Range:	$4-20, 0-1.0, 0-10$
Default Value:	$4-20$
Default Access Level	4
Function number	4140 to 4141

One or two analog outputs are optionally available in either 12 or 16 bit versions. The 12 bit version output is fixed at 4-20mA. With the 16 bit version the user can select 4-20mA, 0-1VDC or 0-10VDC output at this function.

5.17   Analog retransmission rate or total

Section:	`ro1` to `ro2`
Display:	`InPt`
Range:	`rAtE` or `totL`
Default Value:	`rAtE`
Default Access Level	`4`
Function number	`43E0` to `43E1`

Allows selection of either rate value or total value to be retransmitted.

5.18   Analog retransmission low display value

Section:	`ro1` to `ro2`
Display:	`Lo`
Range:	Any display value
Default Value:	`0`
Default Access Level	`4`
Function number	`4120` to `4121`

This function can be used to set the analog retransmission signal output low value in displayed engineering units. For example to set analog output 1 to retransmit 4mA (or 0V if available) for a display value of zero set `ro1 Lo` to `0`.

5.19   Analog retransmission high display value

Section:	`ro1` to `ro2`
Display:	`HiGh`
Range:	Any display value
Default Value:	`1000`
Default Access Level	`4`
Function number	`4130` to `4131`

This function can be used to set the analog retransmission signal output high value in displayed engineering units. For example to set analog output 1 to retransmit 20mA (or 1V or 10V if available) for a display value of 200 set `ro1 Lo` to `200`.

5.20   Operation mode

Section:	`OPEr`
Display:	`CH1 OPEr`
Range:	`rAtE`, `totL`, `both`
Default Value:	`rAtE`
Default Access Level	`4`
Function number	`4C40`

This function set the operation mode for the display. If set to `rAtE` the display will act as a rate display only and no totaliser functions will be seen and no total can be viewed. If set to `totL` the display will act as a totaliser display only and no rate functions will be seen and no rate can be viewed. If set to `both` then both rate and total functions will be available and the user can use the front pushbuttons to toggle between rate and total displays.

5.21 Default display

Section:	*OPEr*
Display:	*dFlt d.5P*
Range:	*RATE* or *totL*
Default Value:	*RATE*
Default Access Level	*4*
Function number	*4438*

This function sets the default display to either rate (*RATE*) or total *totl* when *both* (rate and total display) has been selected at the *CH 1 OPEr* function. The front pushbuttons, if fitted can be used to toggle between displays but the instrument will always return to its default display after approximately 30 seconds. The display will always show the default display on power up. When toggled to an alternate display e.g. total then a message (e.g. *totl*) will flash approximately once every 8 seconds to indicate that the display currently being viewed is not the default display.

5.22 Decimal point setting for ratementer

Section:	*RATE*
Display:	*d.Pnt*
Range:	*0*, *0.1*, *0.02*, *0.003*
Default Value:	*0*
Default Access Level	*4*
Function number	*4100*

This function is only seen when *RATE* or *both* mode selected a the *CH 1 OPEr* function. Displays and sets the decimal point position for the rate display. For example selecting *0* will mean no decimal points (e.g. a display such as *25*), *0.1* means 1 decimal point place (e.g. *2.4*), *0.02* gives 2 decimal point places (e.g. *2.35*) etc. The maximum number of decimal point places is one less than the number of digits on the display e.g. a 4 digit display can have 3 decimal points, a 6 digit display can have 5 decimal points etc. Note: If the number of decimal points is altered then the display scaling figure (*SCL*) will also be affected. Always check the scaling figure following a decimal point change and alter as required.

5.23 Rate display scaling method

Section:	*RATE*
Display:	*USEr CAL*
Range:	*InPt*, *USEr*, *LiUE*
Default Value:	*InPt*
Default Access Level	*CAL*
Function number	*4C4A*

Allows selection of frequency scaling method required. Three methods are available:

- *InPt* - this method uses *InPt* and *SCL* functions to scale the display.

- *USEr* - this method allows the user to enter two frequencies in Hz (*RATE CAL In 1* and *RATE CAL In 1* and enter a scaling value for each frequency (*RATE CAL SCL 1* and *RATE CAL SCL 2*) to provide the rate display scaling.

- *LiUE* - this method allows the user to apply two known input frequencies (*RATE CAL 1* and *RATE CAL2*) and apply a scaling (*RATE CAL 1SCLE* and *RATE CAL2 SCLE*) for each frequency.

See each individual function for further explanation.

5.24 Input value for ratemeter

Section:	`rAtE`
Display:	`inPt`
Range:	`1` to Maximum display value
Default Value:	`1`
Default Access Level	`4`
Function number	`4C44`

This function is only seen when `rAtE` or `both` mode selected a the `CH 1 OPEr` function. Displays and sets the input pulse rate to be used with the rate scale function to generate the display scaling. See formula below.

5.25 Scale value for ratemeter

Section:	`rAtE`
Display:	`SCL`
Range:	`1` to Maximum display value
Default Value:	`1`
Default Access Level	`4`
Function number	`4C46`

Displays and sets the scale factor to be used with the ratemeter input setting. Scale and input work together to produce a display as follows:

$$New\,Display = \left(\frac{Input\,frequency\,(Hz) \times Rate\,Scale}{Rate\,Input} \right)$$

5.26 Ratemeter display filter

Section:	`rAtE`
Display:	`FLtr`
Range:	`0`, `1`, `2`, `3`, `4`, `5`, `6`, `7`, `8`
Default Value:	`0`
Default Access Level	`4`
Function number	`43C0`

This function is only seen when `rAtE` or `both` mode selected a the `CH 1 OPEr` function. Digital filtering uses a weighted average method of determining the display value and is used for reducing display value variation due to short term interference. The digital filter range is selectable from 0 to 8, where 0 = none and 8 = most filtering. Note that the higher the filter setting the longer the display may take to reach its final value when the input is changed, similarly the relay operation and any output options will be slowed down when the filter setting is increased.

5.27 Display rounding for ratemeter

Section:	`rAtE`
Display:	`d.rnd`
Range:	`1` to `5000`
Default Value:	`1`
Default Access Level	`4`
Function number	`43b0`

This function is only seen when `rAtE` or `both` mode selected a the `CH 1 OPEr` function. Displays and sets the display rounding value. This value may be set to 1 to 5000 displayed units. Display rounding is useful for reducing the instrument resolution without loss of accuracy in applications where it is undesirable to display to a

fine tolerance. Example: If set to 10 the display values will change in multiples of 10 only i.e. display moves from 10 to 20 to 30 etc.

5.28   Rate low value visual warning

Section:	rAtE
Display:	$\mathsf{Lo\ diSP}$
Range:	Any display value or OFF
Default Value:	OFF
Default Access Level	4
Function number	$\mathsf{4550}$

This function is only seen when rAtE or both mode selected a the $\mathsf{CH\ 1\ OPEr}$ function. Rate display low overrange limit value - the display can be set to show an overrange message if the display value falls below the Lo diSP setting. For example if $\mathsf{Lo\ diSP}$ is set to 50 then once the display reading falls below 50 the display can be programmed to show an overrange message set by the diSP instead of the normal display units. This message can be used to alert operators to the presence of an input which is below the low limit. If this function is not required it should be set to OFF by pressing the ▲ and ▼ buttons simultaneously at this function.

5.29   Rate high value visual warning

Section:	rAtE
Display:	$\mathsf{Hi\ diSP}$
Range:	Any display value or OFF
Default Value:	OFF
Default Access Level	4
Function number	$\mathsf{4560}$

This function is only seen when rAtE or both mode selected a the $\mathsf{CH\ 1\ OPEr}$ function. Rate display high overrange limit value - the display can be set to show an overrange message if the display value falls below the $\mathsf{Hi\ diSP}$ setting. For example if $\mathsf{Hi\ diSP}$ is set to 1000 then once the display reading rises above 1000 the display can be programmed to show an overrange message set by the diSP instead of the normal display units. This message can be used to alert operators to the presence of an input which is above the high limit. If this function is not required it should be set to OFF by pressing the ▲ and ▼ buttons simultaneously at this function.

5.30   Warning message for low and high display

Section:	rAtE
Display:	diSP
Range:	NONE, FLSH, $\mathsf{----}$, $\mathsf{Or.Ur}$, $\mathsf{Hi.Lo}$
Default Value:	NONE
Default Access Level	4
Function number	$\mathsf{4570}$

This function is only seen when rAtE or both mode selected a the $\mathsf{CH\ 1\ OPEr}$ function. Display overrange warning flashing mode - this function is used in conjunction with the $\mathsf{Lo\ diSP}$ and $\mathsf{Hi\ diSP}$ functions. If the display warning value set at the $\mathsf{Lo\ diSP}$ or $\mathsf{Hi\ diSP}$ function is exceeded and the diSP function is set to FLSH then the display value will ash on and off every second as a visual warning. If the display warning value set at the $\mathsf{Lo\ diSP}$ or $\mathsf{Hi\ diSP}$ function is exceeded and the diSP function is set to $\mathsf{----}$ then the display the $\mathsf{----}$ message will flash once per second. If the display warning value set at the $\mathsf{Lo\ diSP}$ or $\mathsf{Hi\ diSP}$ function is exceeded and the diSP function is set to $\mathsf{Or.Ur}$ then the display the $\mathsf{-Or-}$ message will flash once per second if the high limit is exceeded or $\mathsf{-Ur-}$ if the low limit is exceeded. If the display warning value set at the $\mathsf{Lo\ diSP}$ or $\mathsf{Hi\ diSP}$ function is exceeded and the diSP function is set to $\mathsf{Hi.Lo}$ then the display the

-H, - message will flash once per second if the high limit is exceeded or -Lo - if the low limit is exceeded. A setting of NONE will disable this function. The warning flashes will cease and the normal display value will be seen when the value displayed is higher than the low limit and lower than the high limit.

5.31   Rate input range or mode

Section: rAtE
Display: rNgE
Range: Lo.F, Hi.F, AUgE, r.AUg
Default Value: Hi.F
Default Access Level 4
Function number   4C4E

The options for this function are:

Lo.F - this mode can be used for frequencies which are likely to be below 4Hz with a maximum of 5kHz. When set for this mode a time out function **t.Out** can be used to set a time for the instrument to wait for an input. For example without the timeout function if the input is 1Hz minimum the frequency display would alternate between showing the frequency according to the scaling and a zero display due to the instrument sampling faster than the input. If the timeout were set to longer than 1 second the display would wait for this time period and retain the last frequency value on the display. The display would then only show zero if no new pulses are input within the time in seconds set by **t.Out** .

Hi.F - this is the mode to use when the input frequency will not go below 4Hz (maximum 100kHz).

AUgE - Average display. The averaged display allows the input rate to be averaged over a period of seconds set by the **A.SEc** function. An averaged display is particularly useful when the input is irregular. By averaging the pulses over a period of time the display will give a more stable reading for these irregular pulses.

r.AUg - Rolling average. The rolling average allows the frequency/rate reading to be averaged over a period set by the **A.SEc** function but this average is taken over a programmable number of counts set at the **A.cnt** function. For example when set to **r.AUg** if the **A.SEc** function is set to 300 (300 seconds or 5 minutes) and the **A.cnt** (average count) function set to 12 the display will be averaged and updated every 5 minutes with each new update showing not the average of the last 5 minutes but the average of the last 12 x 5 minute (1 hour) time periods. For this example starting with a zero display a steady input scaled to read 1200 per hour would read 100 after the first 5 minutes, 200 after the second 5 minutes etc. up to 1200 after 1 hour (12 x 5 minutes). Beyond this time the display will update every 5 minutes showing the average over the last 12 x 5 minute time periods. The rate will be zeroed when the display is switched off or if the input stops for a sufficient time to allow the rate to fall to zero.

5.32   Timeout for low frequency input

Section: rAtE
Display: t.Out
Range: 1 to 3200 secs
Default Value: 10
Default Access Level 4
Function number   4C6C

Only seen if **Lo.F** is selected at the **rNgE** function. Displays and sets the time out in seconds when using the low frequency range. The timeout allows very low frequency inputs to be used without the display reverting to zero between samples. If no input pulses are received the display holds the previous display value for the time out period. If a pulse is received during this time the display will update. If no pulses are received or the input period exceeds the time out value set then the display will indicate zero.

5.33 Time period for average rate display

Section: `rAtE`
Display: `A.SEc`
Range: `1` to `5000` secs
Default Value: `1`
Default Access Level `4`
Function number `4C6E`

Only seen if `AVGE` or `r.AVG` is selected under the `rngE` function. Displays and sets the number of seconds over which the rate should be averaged. The rate display will not update until the end of the average seconds time. This function allows the user to select a display update rate most suitable for applications in which the rate input may be irregular.

5.34 Counts for average rate display

Section: `rAtE`
Display: `A.cnt`
Range: `0` to `30`
Default Value: `1`
Default Access Level `4`
Function number `4C70`

Only seen if `r.AVG` is selected at the `rngE` function. Sets the number of time periods counted over which the rolling average display will be calculated. For example if the `A.SEc` is set to 60 and the `1` is set to 10 then the rolling average displayed will be the average of the last ten 60 second averaged periods.

5.35 Rate `USEr` scaling mode frequency 1

Section: `rAtE`
Display: `CAL in1`
Range: Any display value
Default Value: n/a
Default Access Level `CAL`
Function number `46E0`

When the `USEr` method of scaling is chosen at the `USEr CAL` function the user can enter two frequency values in Hz via the pushbuttons and enter a scale value for each frequency. This method or the `LinE` method can used when the display is required to be not directly related to the actual frequency input e.g. when a display of zero is required for an input which is not zero Hz. The method used is as follows:

- at the `CAL in1` function press the **F** button then use the **▲** or **▼** pushbuttons to select the required first frequency.

- Press **F** when the required first frequency is shown (a `CAL End` message should be seen) then press the **▲** pushbutton to move to the first scale function `CAL SCL.1`.

- Press **F** then use the **▲** or **▼** pushbuttons to select the required scale value for the first frequency. e.g. if a display reading of zero is required for a 1000 Hz input frequency then set `CAL in1` to `1000` and set `CAL SCL.1` to `0`.

It is necessary to enter two scaling points so repeat the process using a different frequency and scale selection using `CAL in2` and `CAL SCL.1`.

5.36 Rate **USEr** scaling mode scale 1

Section: **rAtE**
Display: **CAL SCL.1**
Range: Any display value
Default Value: n/a
Default Access Level **CAL**
Function number **4700**

First scale input value for **USEr** scaling mode. See the **CAL iN1** function for explanation.

5.37 Rate **USEr** scaling mode frequency 2

Section: **rAtE**
Display: **CAL iN2**
Range: Any display value
Default Value: n/a
Default Access Level **CAL**
Function number **46F0**

Second frequency input value for **USEr** scaling mode. See the **CAL iN1** function for explanation.

5.38 Rate **USEr** scaling mode scale 2

Section: **rAtE**
Display: **CAL SCL.2**
Range: Any display value
Default Value: n/a
Default Access Level **CAL**
Function number **4710**

Second scale input value for **USEr** scaling mode. See the **CAL iN1** function for explanation.

5.39 Rate **LiVE** scaling mode uncalibration (scaling reset)

Section: **rAtE**
Display: **U.CAL**
Range: n/a
Default Value: n/a
Default Access Level **CAL**
Function number **0b20**

This function can be used to reset the display to its default input of 1Hz displays **1** (or **1.0** etc.). To reset the display scaling go to the **U.CAL** function and press **F** then toggle using the ▲ or ▼ pushbutton from **NO** to **YES** and press **F**. The display should show the message **U.CAL End** to indicate that the scaling has been reset to default.

5.40 Rate `LiUE` scaling mode input frequency 1

Section:	`rAtE`
Display:	`CAL1`
Range:	n/a
Default Value:	n/a
Default Access Level	`CAL`
Function number	`0b00`

This function is only used and seen when the `CAL 1 n 1` is set to `LiUE`. This method of scaling allows the user to apply two different known frequencies at the `CAL 1 n 1` and `CAL 1 n2` functions and at each of these functions apply a scale value for each input (`CAL1 SCLE` and `CAL2 SCLE`). The method used to scale in the `LiUE` mode is:

- Apply the first known frequency to the input.

- At the `CAL1` function press ▣ then toggle using the ▲ or ▼ pushbutton from `nO` to `YES` and press ▣. A display reading should now be seen. The value displayed is not important but it must be stable before proceeding.

- Press ▣, the message `rAtE CAL1 SCLE` will be seen followed by a value. Use ▲ or ▼ to set the display value required for the first input frequency then press ▣. The message `CAL End` should be seen to indicate that the first scaling point is increased.

It is necessary to enter two scaling points so repeat the process using a different frequency and scale selection at the `CAL2` function.

If an error message is seen e.g. `CAL FAiL` proceed to the second scaling point and perform the second input and scaling anyway. If the error message is seen at both scaling points then check the input signal and input settings.

5.41 Rate `LiUE` scaling mode input frequency 2

Section:	`rAtE`
Display:	`CAL2`
Range:	n/a
Default Value:	n/a
Default Access Level	`CAL`
Function number	`0b10`

Second frequency and scale input value for `LiUE` scaling mode. See the `CAL1` function for explanation.

5.42 Rate `LiUE` display offset

Section:	`rAtE`
Display:	`OFSt`
Range:	n/a
Default Value:	n/a
Default Access Level	`CAL`
Function number	`0b60`

This function can be used to apply an offset value to the display reading, it is only used and seen when the `CAL1 n1` is set to `LiUE`. When applying an offset the offset value will be added or subtracted across the measuring range.

The method used to apply an offset in the `LiUE` mode is:

- Apply a known frequency to the input.

- At the **OFSt** function press **F** then toggle using the **▲** or **▼** pushbutton from **no** to **YES** and press **F**.

- The current value will be displayed. Press **F** and use the **▲** or **▼** pushbutton to adjust the current value to the required display value for that input.

- When the required display value is set press **F** to accept and store this new value. The message **OFSt End** will be displayed.

5.43   Decimal point setting for totaliser

Section:	**tot**
Display:	**d.Pnt**
Range:	**0**, **0.1**, **0.02**, **0.003**
Default Value:	**0**
Default Access Level	**4**
Function number	**4102**

This function is only seen when **totL** or **both** mode selected a the **CH1 OPEr** function. Displays and sets the decimal point position for the total display. For example selecting **0** will mean no decimal points (e.g. a display such as **25**), **0.1** means 1 decimal point place (e.g. **2.4**), **0.02** gives 2 decimal point places (e.g. **2.35**) etc. The maximum number of decimal point places is one less than the number of digits on the display e.g. a 4 digit display can have 3 decimal points, a 6 digit display can have 5 decimal points etc. Note: If the number of decimal points is altered then the display scaling figure (**SCL**) will also be affected. Always check the scaling figure following a decimal point change and alter as required.

5.44   Input value for totaliser

Section:	**tot**
Display:	**inPt**
Range:	**1** to Maximum display value
Default Value:	**1**
Default Access Level	**4**
Function number	**4C52**

This function is only seen when **totL** or **both** mode selected a the **CH1 OPEr** function. Displays and sets the number of input pulses to be used with the total scale function to generate the display scaling. See examples which follow and the formula below.

5.45   Scale value for totaliser

Section:	**tot**
Display:	**SCL**
Range:	**1** to Maximum display value
Default Value:	**1**
Default Access Level	**4**
Function number	**4C54**

Displays and sets the scale factor to be used with the total input setting. Scale and input work together to produce a display as follows:

$$New\,total \;=\; Old\,total \;+\; \left(\frac{Input\,pulses\,counted \;\times\; Total\,Scale}{Total\,Input} \right)$$

5.46   Display rounding for totaliser

Section: ᴛᴏᴛ
Display: d.rnd
Range: 1 to 5000
Default Value: 1
Default Access Level 4
Function number   4362

Displays and sets the display rounding value. This value may be set to 1 to 5000 displayed units. Display rounding is useful for reducing the instrument resolution without loss of accuracy in applications where it is undesirable to display to a fine tolerance. Example: If set to 10 the display values will change in multiples of 10 only i.e. display moves from 10 to 20 to 30 etc.

5.47   Truncation operation

Section: ᴛᴏᴛ
Display: trnc
Range: trnc, rnd
Default Value: trnc
Default Access Level 4
Function number   4C56

This function is only seen when **totL** or **both** mode selected a the **CH 1 OPEr** function. When set to **rnd** the display will round up to the nearest total value. When set to **trnc** the display will not round up. For example with **iNPt** set to 10 and **SCL** set to 1 (i.e. 10 pulses for 1 count) and with the display just reset to zero if truncation is not used then after 6 input pulses the display will round up to show 1. With truncation set to on the display will not show 1 until the full 10 input pulses have been received.

5.48   Totaliser count up/down operation

Section: ᴛᴏᴛ
Display: dir
Range: UP, doun, UP.dn
Default Value: UP
Default Access Level 4
Function number   4C48

Allows selection of either count up (**UP**) i.e. total increments when incoming pulses are received or count down (**doun**) i.e. total decrements when incoming pulses are received or allow the up/down count to be controlled by the state of the input on input 2 (**UP.dn** selection).

5.49   Grand total operation mode

Section: ᴛᴏᴛ
Display: 9.tot
Range: NonE, For, rEu, PoS, NE9, AbS
Default Value: NonE
Default Access Level 4
Function number   4C58

This function is only seen when **totL** or **both** mode selected a the **CH 1 OPEr** function. Grand total operating mode - By using the ▲ or ▼ pushbutton the display may be toggled between a total or a grand total display (or between rate, total and grand total in **both** mode). The display will briefly show either **rAtE**, **tot1** or **9tot**

to indicate what the following total display is showing. A remote input or the **P** button can be programmed to reset the grand total. Six modes of grand total display are provided namely:

NonE, **For**, **rEu**, **PoS**, **nE9**, **AbS** or **rSt**

The table below explains how each mode operates

Mode	Up Count	Down Count
NonE	No effect	No effect
For	The grand total will increase with each up count input pulse. The grand total can show positive and negative totals.	The grand total will decrease with each down count input pulse. The grand total can show positive and negative totals.
rEu	The grand total will decrease with each up count input pulse. The grand total can show both positive and negative totals.	The grand total will increase with each down count input pulse. The grand total can show both positive and negative totals.
PoS	The grand total will increase with each up count input pulse. The grand total display cannot go negative.	The grand total will not register any down count inputs i.e. the grand total will not change when down count only inputs are present. The grand total display cannot go negative.
nE9	The grand total will not register any up count inputs i.e. the grand total will not change when up count only inputs are present. The grand total display cannot go negative.	The grand total will increase with each down count input pulse. The grand total display cannot go negative.
AbS	The grand total will increase with any input pulse whether up or down count. The grand total display cannot go negative.	The grand total will increase with any input pulse whether up or down count. The grand total display cannot go negative.
rSt	Not currently used	Not currently used

5.50   Total low value visual warning

Section:	**tOt**
Display:	**Lo diSP**
Range:	Any display value or **OFF**
Default Value:	**OFF**
Default Access Level	**4**
Function number	**4552**

This function is only seen when **tOtL** or **both** mode selected a the **CH1 OPEr** function. Totaliser low overrange limit value - the display can be set to show an overrange message if the display value falls below the **Lo diSP** setting. For example if **Lo diSP** is set to 50 then once the display reading falls below 50 the display can be programmed to show an overrange message set by the **diSP** instead of the normal display units. This message can be used to alert operators to the presence of a total which is below the low limit. If this function is not required it should be set to **OFF** by pressing the ▲ and ▼ buttons simultaneously at this function.

5.51 Total high value visual warning

Section:	**tOt**
Display:	**Hi diSP**
Range:	Any display value or **OFF**
Default Value:	**OFF**
Default Access Level	**4**
Function number	**4562**

This function is only seen when **tOtL** or **both** mode selected a the **CH1 OPEr** function. Totaliser high overrange limit value - the display can be set to show an overrange message if the display value goes below the **Hi diSP** setting. For example if **Hi diSP** is set to 1000 then once the display reading rises above 1000 the display can be programmed to show an overrange message set by the **diSP** instead of the normal display units. This message can be used to alert operators to the presence of a total which is above the high limit. If this function is not required it should be set to **OFF** by pressing the ▲ and ▼ buttons simultaneously at this function.

5.52 Warning message for low and high display

Section:	**tOt**
Display:	**diSP**
Range:	**NONE**, **FLSH**, **- - - -**, **OF.UF**, **Hi.Lo**
Default Value:	**NONE**
Default Access Level	**4**
Function number	**4572**

This function is only seen when **tOtL** or **both** mode selected a the **CH1 OPEr** function. Display overrange warning flashing mode - this function is used in conjunction with the **Lo diSP** and **Hi diSP** functions. If the display warning value set at the **Lo diSP** or **Hi diSP** function is exceeded and the **diSP** function is set to **FLSH** then the display value will ash on and off every second as a visual warning. If the display warning value set at the **Lo diSP** or **Hi diSP** function is exceeded and the **diSP** function is set to **- - - -** then the display the **- - - -** message will flash once per second. If the display warning value set at the **Lo diSP** or **Hi diSP** function is exceeded and the **diSP** function is set to **OF.UF** then the display the **-OF -** message will flash once per second if the high limit is exceeded or **-UF -** if the low limit is exceeded. If the display warning value set at the **Lo diSP** or **Hi diSP** function is exceeded and the **diSP** function is set to **Hi.Lo** then the display the **-Hi -** message will flash once per second if the high limit is exceeded or **-Lo -** if the low limit is exceeded. A setting of **NONE** will disable this function. The warning flashes will cease and the normal display value will be seen when the value displayed is higher than the low limit and lower than the high limit.

5.53 Power on total reset

Section:	**tOt**
Display:	**P.On r.SEt**
Range:	**OFF**, **r.SEt**, **P.SEt**
Default Value:	**OFF**
Default Access Level	**4**
Function number	**4C86**

This function is only seen when **tOtL** or **both** mode selected a the **CH1 OPEr** function. The power on reset function can be set to cause the total value in memory to be reset to zero each time the display is powered up. If this function is set to **OFF** then the power up will have no effect on the total.

5.54 Power on grand total reset

Section:	**t0t**
Display:	**9t.0n r.SEt**
Range:	**0FF, r.SEt**
Default Value:	**0FF**
Default Access Level	**4**
Function number	**4C88**

This function is only seen when **t0tL** or **both** mode selected a the **CH 1 0PEr** function. The power on grand total reset function can be set to cause the grand total value in memory to be reset of forced reset to zero each time the display is powered up. If this function is set to **0FF** then the power up will have no effect on the grand total.

5.55 Total preset value

Section:	**t0t**
Display:	**P.SEt**
Range:	Any display value
Default Value:	**0**
Default Access Level	**4**
Function number	**4C60**

This function is only seen when **t0tL** or **both** mode selected a the **CH 1 0PEr** function. When a reset operation is undertaken via the reset input or power on reset then the display can be set to reset to zero or to a preset value, the preset value can be set at this function. Presets are commonly used when counting down from a value towards zero.

5.56 Wrap around operation

Section:	**t0t**
Display:	**JrAP 0PEr**
Range:	**0FF, r.SEt, P.SEt, d.rAP**
Default Value:	**r.SEt**
Default Access Level	**4**
Function number	**4C8A**

This function is only seen when **t0tL** or **both** mode selected a the **CH 1 0PEr** function. If set to **0FF** this function is disabled. If set to **r.SEt** the display will reset to zero when the value set at **r.UAL** function is reached and if set to **P.SEt** the display will reset to the preset value set by the **P.SEt** function when the value set at **r.UAL** function is reached. If set to **d.rAP** then the display will automatically reset to zero when its maximum display value is reached e.g. above 9999 on a 4 digit display. Note if changing from preset to reset operation it will be necessary to force the display back to the reset (zero) or preset value prior to a new count.

5.57   Automatic reset wrap around value

Section:	ᵗᴏᵗ
Display:	r.UAL
Range:	Any display value or OFF
Default Value:	OFF
Default Access Level	4
Function number	4C8C

This function is only seen when ᵗᴏᵗL or ᵇᴏᵗʰ mode selected a the CH 1 OPEr function. This function allow the display to be forced to automatically reset when the value set at this function is reached. e.g. the display can be set to reset each time a total value of 1000 is reached.

5.58   Input 1 pull up

Section:	ᵢᴺ 1
Display:	PULL UP
Range:	OPEn, Hᵢ 9h, Lo
Default Value:	Hᵢ 9h
Default Access Level	4
Function number	4C00 to 4C01

Allows electrical input setting of input 1. When set to Hᵢ 9h approximately 5VDC will be placed on the input internally. When set to Lo the input will be pulled down to 0V (signal ground). When set to OPEn signals up to 48VDC can be applied. See "Electrical Installation" chapter for further information.

5.59   Input 1 bias

Section:	ᵢᴺ 1
Display:	bᵢAS
Range:	OFF, On
Default Value:	On
Default Access Level	4
Function number	4C02 to 4C03

Allows electrical input bias setting of input 1. When set to On an input bias voltage will be applied to the input circuit. When set to OFF no bias voltage will be applied to the input circuit. This function should be set to On when the input signal does not go below 0V. See "Electrical Installation" chapter for further information.

5.60   Input 1 low frequency

Section:	ᵢᴺ 1
Display:	LoF
Range:	OFF, On
Default Value:	OFF
Default Access Level	4
Function number	4C04 to 4C05

Allows application of a low pass filter setting for input 1. When set to On an low pass filter will be applied to the input circuit. When set to OFF no low pass filter will be applied to the input circuit. This function should be

set to **On** for inputs likely to generate contact bounce such as switch and relay inputs but it can also be useful for blocking higher frequency signals when only low frequency inputs are being used. The filter will only allow signals of approx. 75Hz or lower to pass to the input stage. See "Electrical Installation" chapter for further information.

5.61   Input 1 hysteresis

Section:	In1
Display:	HYSt
Range:	OFF, On
Default Value:	OFF
Default Access Level	4
Function number	4C06 to 4C07

Allows application "hysteresis" setting for input 1. When set to **OFF** the input gain will be set for signals of 25mV to 250mV. When set to **On** the input gain will be set for signals above 250mV. When set to **OFF** the input will accept lower amplitude signals but will also be more likely to pick up electrical noise. See "Electrical Installation" chapter for further information.

5.62   Inputs 1 and 2 attenuation

Section:	In1
Display:	Attn
Range:	OFF, On
Default Value:	OFF
Default Access Level	4
Function number	4C08 to 4C09

Allows application of a 5 times attenuation for input 1. When set to **OFF** no attenuation will be applied. When set to **On** the input signal will be reduced by a factor of 5 before moving on to the first amplification stage. Applying attenuation can be used to reduce the noise level of the input signal when the input signal itself is large enough to be attenuated e.g. a 0 to 20V square wave will become 0 to 4V square wave after attenuation. See "Electrical Installation" chapter for further information.

5.63   Input 1 DC coupling

Section:	In1
Display:	dC
Range:	OFF, On
Default Value:	On
Default Access Level	4
Function number	4C0A to 4C0b

Allows application of DC coupling for input 1. When set to **OFF** no DC coupling be applied. When set to **On** DC coupling will be applied. DC coupling should be used (set to **On**) when using switch or relay inputs or when the input frequency is always going to be less than 10Hz. See "Electrical Installation" chapter for further information.

5.64   Input 1 input edge or level

Section:	ı *Π* ı
Display:	*EdGE*
Range:	*Lo.E*, *Hı .E*
Default Value:	*Lo*
Default Access Level	*4*
Function number	*4E ı0* to *4E ı ı*

Allows selection of input edge or level for input 1.
Select *Lo* for the input to be triggered by a low level signal i.e. input will be triggered whilst the input is held low.
Select *Hı* for the input to be triggered by a high level signal i.e. input will be triggered whilst the input is held high.
Select *LoE* for the input to be triggered by a low going edge i.e. falling from a voltage towards zero.
Select *Hı E* for the input to be triggered by a high going edge i.e. rising from a low voltage.
See "Electrical Installation" chapter for further information.

5.65   Input 1 de-bounce timer

Section:	ı *Π* ı
Display:	*d.bnc*
Range:	*0* to *ı5* ms
Default Value:	*0*
Default Access Level	*4*
Function number	*4E ı8* to *4E ı9*

Allows application of a de-bounce timer for input 1. A de-bounce time of between 0 and 1000mS can be set for input 1. When a de-bounce time is set the signal level before the input trigger signal must have been at that level for the de-bounce time or longer. This is used to help prevent false triggering. For example if the input is triggered by a high level or high going edge and the de-bounce time is set to 100mS then the input would have to be at a low level for at least 100mS before the input is triggered, if not then the input trigger will not be accepted. See "Electrical Installation" chapter for further information.

5.66   Digital input edge or level selection

Section:	ı *n.d ı* to ı *n.d3*
Display:	*EdGE*
Range:	*Lo*, *Hı* , *Lo.E*, *Hı .E*, *NonE*
Default Value:	*Lo*
Default Access Level	*4*
Function number	*4E ı2* to *4E ı4*

Allows selection of input edge or level for digital inputs 1, 2 and 3 (terminal marked "DIGITAL IN").
Select *Lo* for the input to be triggered by a low level signal i.e. input will be triggered whilst the input is held low.
Select *Hı* for the input to be triggered by a high level signal i.e. input will be triggered whilst the input is held high.
Select *LoE* for the input to be triggered by a low going edge i.e. falling from a voltage towards zero.
Select *Hı E* for the input to be triggered by a high going edge i.e. rising from a low voltage.
Select *NonE* to disable this input.
See "Electrical Installation" chapter for further information.

5.67 Digital inputs 1, 3 and 3 de-bounce timer

Section:	*i n.d 1* to *i n.d3*
Display:	*d.bnc*
Range:	*0* to *1000* ms
Default Value:	*0*
Default Access Level	*4*
Function number	*4C 1A* to *4C 1C*

Allows application of a de-bounce timer for digital inputs 1, 2 and 3 (terminal marked "DIGITAL IN"). A de-bounce time of between 0 and 1000mS can be set for inputs 1, 2 and 3. When a de-bounce time is set the signal level before the input trigger signal must have been at that level for the de-bounce time or longer. This is used to help prevent false triggering. For example if the input is triggered by a high level or high going edge and the de-bounce time is set to 100mS then the input would have to be at a low level for at least 100mS before the input is triggered, if not then the input trigger will not be accepted. See "Electrical Installation" chapter for further information.

5.68 Output voltage selection

Section:	*P.Out*
Display:	*P.Out*
Range:	*5U*, *12U*, *18U*
Default Value:	*5U*
Default Access Level	*4*
Function number	*4COF*

Allows selection of the excitation voltage where available on the input board at terminal or terminals. 5V, 12V or 18VDC (25mA max.) is available as transmitter supply this function allow selection of 5V (*5 U*) or 12V (*12U*) or 18V (*18U*). Transmitter supply voltages are approximate. If a change is made the *P.Out* function must be exited before the supply will change.

5.69 Front P button operation mode

Section:	*r.i nP*
Display:	*P.but*
Range:	*NONE*, *P.Hi*, *P.Lo*, *Hi.Lo*, *AL.Ac*, *rSEt*, *9.rSt*, *PSEt*
Default Value:	*NONE*
Default Access Level	*4*
Function number	*4720*

Sets the operation mode for front P button. Functions available are identical to the same functions used in the *r.i n. 1* to *r.i n.4* functions.

5.70 Remote input 1 operation mode

Section:	*r.I nP*
Display:	*r.I n.I*
Range:	*nonE, P.HI d, d.HI d, P.HI, P.Lo, HI .Lo, AL.Ac, ACCS, P.but, F.but,*
	U.but, d.but, duI I, rSEt, 9.rSt, StoP, PSEt
Default Value:	*nonE*
Default Access Level	*4*
Function number	*4721*

Sets the operation mode for remote input 1 terminal. Choices are as follows:

- *nonE* - If this option is selected then remote input 1 will have no function.

- *P.Hol d* - peak hold. The display will show the peak value (highest positive value) only whilst the remote input terminals are short circuited i.e. the display value can rise but not fall whilst the input terminals are short circuited. The message *P.HI d* will appear briefly every 8 seconds whilst the input terminals are short circuited to indicate that the peak hold function is active. All active channels will be peak held when this mode is chosen and activated.

- *d.Hol d* - display hold. The display value will be held whilst the remote input terminals are short circuited. The message *d.HLd* will appear briefly every 8 seconds whilst the input terminals are short circuited to indicate that the display hold function is active. All active channels will be display held when this mode is chosen and activated.

- *P.HI* - peak memory. The peak value stored in memory will be displayed if the remote input terminals are short circuited, if the short circuit is momentary then the display will return to normal measurement after 20 seconds. If the short circuit is held for 2 to 3 seconds or the power is removed from the instrument then the memory will be reset, a *rSt* message will be seen if the memory is reset by holding a short circuit for 2 to 3 seconds. The peak high mode will operate on all active channels.

- *P.Lo* - valley memory. The minimum value stored in memory will be displayed. Otherwise operates in the same manner as the *P.HI* function described above. The peak low mode will operate on all active channels.

- *HI .Lo* - toggle between *HI* and *Lo* displays. This function allows the remote input to be used to toggle between peak and valley memory displays. The first operation of the remote input will cause the peak memory value to be displayed, the next operation will give a valley memory display. *P.HI* or *P.Lo* will flash before each display to give an indication of display type. The peak high/low mode will operate on all active channels.

- *AI .AC* - alarm acknowledge. Allows the remote input to be used to acknowledge an alarm. If the alarm is set for latching operation the acknowledgment will allow the alarm and any relays allocated to that alarm to reset when the alarm condition is removed. If the alarm is set for automatic reset the acknowledgment will allow the alarm and any relays allocated to that alarm to reset even if the alarm condition still exists this could typically be used to silence a siren controlled by a relay even though the alarm condition is still present. The acknowledge will operate on all alarms programmed to require acknowledgement.

- *ACCS* - remote input access. Allows the remote input to be used for setup function access control purposes. Refer to the " Accessing setup functions" in the Introduction chapter.

- *P.but* - allows the selected remote input to act as the **P** pushbutton.

- *F.but* - allows the selected remote input to act as the **F** pushbutton.

- *U.but* - allows the selected remote input to act as the **▲** pushbutton.

- *d.but* - allows the selected remote input to act as the **▼** pushbutton.

- **dull** - remote dulling of the display. When activated the display brightness will fall to the level set by the **diSP dull** level. This is generally used to reduce current consumption in battery powered applications or for switching between day and night brightness levels.

- **rSEt** - zero the total. This mode allows the remote input to be used as a reset to zero input for the total seen in the **totL** and **both** modes.

- **9.rSt** - grand total reset. This mode allows the remote input to be used as a reset input for the grand total seen in the **totL** and **both** modes.

- **StoP** - totaliser inhibit - the total display value will be held and any input pulses ignored whilst the remote input is short circuited. Not applicable to rate display.

- **PSEt** - preset the total. This mode allows the remote input to be used as a reset to preset input for the total seen in the **totL** and **both** modes.

5.71 Remote input 2 operation mode

Section:	**r.inP**
Display:	**r.in.2**
Range:	**nOnE**, **P.Hi d**, **d.Hi d**, **P.Hi**, **P.Lo**, **Hi.Lo**, **AL.Ac**, **ACCS**, **P.but**, **F.but**, **U.but**, **d.but**, **dull**, **rSEt**, **9.rSt**, **StoP**, **PSEt**
Default Value:	**nOnE**
Default Access Level	**4**
Function number	**4722**

Remote input 2 functions. Same choices as **r.inP r.in.1** apply.

5.72 Remote input 3 operation mode

Section:	**r.inP**
Display:	**r.in.3**
Range:	**nOnE**, **P.Hi d**, **d.Hi d**, **P.Hi**, **P.Lo**, **Hi.Lo**, **AL.Ac**, **ACCS**, **P.but**, **F.but**, **U.but**, **d.but**, **dull**, **rSEt**, **9.rSt**, **StoP**, **PSEt**
Default Value:	**nOnE**
Default Access Level	**4**
Function number	**4723**

Remote input 3 functions. Same choices as **r.inP r.in.1** apply.

5.73 Remote input 4 operation mode

Section:	**r.inP**
Display:	**r.in.4**
Range:	**nOnE**, **P.Hi d**, **d.Hi d**, **P.Hi**, **P.Lo**, **Hi.Lo**, **AL.Ac**, **ACCS**, **P.but**, **F.but**, **U.but**, **d.but**, **dull**, **rSEt**, **9.rSt**, **StoP**, **PSEt**
Default Value:	**nOnE**
Default Access Level	**4**
Function number	**4724**

Remote input 4 functions. Same choices as **r.inP r.in.1** apply.

5.74   Remote input (digital inputs) 1 pull up/down operation

Section:	d.in
Display:	d.in.1 P.UP
Range:	OPEn, Hi9h, Lo
Default Value:	Hi9h
Default Access Level	4
Function number	4A50

This function sets the voltage level present on the digital input terminal. If set to **Hi9h** a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to **Lo** then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to **OPEn** then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be "floating", this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.75   Remote input (digital inputs) 1 input level

Section:	d.in
Display:	d.in.1 Lvl
Range:	Hi9h, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A58

This function sets the input level required to activate the remote input. A setting of **Lo** means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of **Hi9h** means that a voltage of 5 to 24V is required to activate the remote input.

5.76   Remote input (digital inputs) 2 pull up/down operation

Section:	d.in
Display:	d.in.2 P.UP
Range:	OPEn, Hi9h, Lo
Default Value:	Hi9h
Default Access Level	4
Function number	4A51

This function sets the voltage level present on the digital input terminal. If set to **Hi9h** a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to **Lo** then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to **OPEn** then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be "floating", this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.77 Remote input (digital inputs) 2 input level

Section:	d.in
Display:	d.in.2 Lul
Range:	HiGh, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A59

This function sets the input level required to activate the remote input. A setting of **Lo** means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of **HiGh** means that a voltage of 5 to 24V is required to activate the remote input.

5.78 Remote input (digital inputs) 3 pull up/down operation

Section:	d.in
Display:	d.in.3 P.UP
Range:	OPEn, HiGh, Lo
Default Value:	HiGh
Default Access Level	4
Function number	4A52

This function sets the voltage level present on the digital input terminal. If set to **HiGh** a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to **Lo** then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to **OPEn** then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be "floating", this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.79 Remote input (digital inputs) 3 input level

Section:	d.in
Display:	d.in.3 Lul
Range:	HiGh, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A5A

This function sets the input level required to activate the remote input. A setting of **Lo** means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of **HiGh** means that a voltage of 5 to 24V is required to activate the remote input.

5.80   Remote input (digital inputs) 4 pull up/down operation

Section:	d.ın
Display:	d.ın.4 P.UP
Range:	OPEn, HıGh, Lo
Default Value:	HıGh
Default Access Level	4
Function number	4A53

This function sets the voltage level present on the digital input terminal. If set to **HıGh** a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to **Lo** then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to **OPEn** then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be "floating", this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.81   Remote input (digital inputs) 4 input level

Section:	d.ın
Display:	d.ın.4 Lvl
Range:	HıGh, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A5b

This function sets the input level required to activate the remote input. A setting of **Lo** means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of **HıGh** means that a voltage of 5 to 24V is required to activate the remote input.

5.82   Automatic display brightness

Section:	dıSP
Display:	brGt Auto
Range:	OFF or On
Default Value:	On
Default Access Level	2
Function number	22FC

Automatic display brightness adjustment. Applies only to instruments with light sensor fitted. The automatic brightness adjustment uses the optional light sensor to gauge the required brightness level for the environment. The high and low brightness limits are set at the **Auto HıGh** and **Auto Lo** functions described below.

5.83   Display brightness

Section:	*di SP*
Display:	*brgt*
Range:	*1* to *63*
Default Value:	*63*
Default Access Level	*2*
Function number	*22Fb*

Allows manual adjustment of the display brightness from 1 (lowest brightness) to 63 (highest brightness).

5.84   Dimmed display brightness

Section:	*di SP*
Display:	*dul l*
Range:	*0* to *63*
Default Value:	*7*
Default Access Level	*2*
Function number	*22EC*

Displays and sets the manually set level for remote input brightness switching. When a remote input is set to *dul l* the remote input can be used to switch between the display brightness level set by the *brgt* function and the dimmed display brightness set by the *dul l* function. The display dull level is selectable from *0* to *63*, where *0* = lowest intensity and *63* = highest intensity. This function is useful in reducing glare when the display needs to be viewed in both light and dark ambient light levels.

5.85   Auto display brightness high level

Section:	*di SP*
Display:	*Auto Hi gh*
Range:	*15* to *63*
Default Value:	*63*
Default Access Level	*2*
Function number	*22EA*

Automatic brightness high level - seen only when *brgt Auto* is set to *ON*. The high brightness level sets the maximum brightness which the automatic brightness control can achieve with 64 being the highest intensity.

5.86   Auto display brightness low level

Section:	*di SP*
Display:	*Auto Lo*
Range:	*1* to *63*
Default Value:	*7*
Default Access Level	*2*
Function number	*22Eb*

Automatic brightness low level - seen only when *brgt Auto* is set to *ON*. The low brightness level sets the minimum brightness which the automatic brightness control can achieve with *64* being the highest intensity and *0* being the lowest intensity.

5.87   Serial output operation mode

Section:	`SEri`
Display:	`OPEr`
Range:	`NONE`, `Cont`, `Poll`, `A.buS`, `diSP`, `m.buS`, `ChAn`
Default Value:	`NONE`
Default Access Level	`4`
Function number	`4480`

Allows selection of the operating mode to be used for RS232 or RS485 serial output communications. See the "LD5/LE5 Series Large Digit Display Output Addendum" for more information and wiring details of optional isolated serial communications.

Choices are:

- `NonE` - no serial comms. required.

- `Cont` - sends ASCII form of display data at a rate typically 90% of the sample rate. The value or values sent depend on the operation mode chosen at the `CH1 OPEr` function.
  In rate (`rAtE`) display mode the value sent will be a start of text character followed by the rate value and ending in a carriage return.
  In total (`totL`) display mode the value sent will be a start of text character followed by the total value and ending in a carriage return.
  In both (`both`) mode (rate and total) the value sent will be a start of text character followed by the rate value followed by a comma then the total value and ending in a carriage return.
  For `totL` and `both` modes if the grand total display is enabled at the `9.tot` function then the grand total will be sent after the total, comma separated.

- `Poll` - controlled by computer or PLC etc. as host. The host sends command via RS232/485 and instrument responds as requested.

- `A.buS` - this is a special communications mode used with Windows compatible PC download software. This mode must be used if communications via USB is used. Refer to the user manual supplied with this optional software.

- `diSP` - sends image data from the display without conversion to ASCII. This mode should only be used when the serial output is connected to another display from the same manufacturer.

- `m.buS` output - Modbus RTU (RS232/RS485) is used. To poll for the display value via Modbus use address 0x1000 and 0x1001 hex (registers 44095 and 44096 decimal), Modbus function

- `ChAn` - Operates in a similar manner to `Cont` mode but only outputs the value chosen at the `SEri Ch` function.

5.88   Serial operation channel

Section:	`SEri`
Display:	`Ch`
Range:	`rAtE`, `totL` or `9.tot`
Default Value:	`rAtE`
Default Access Level	`4`
Function number	`4485`

Allows selection of either rate, total or grand total for serial comms. continuous output when the `CH1 OPEr` function is set to `both`. If `CH1 OPEr` function is set to `rAtE` then only rate can be chosen. If `CH1 OPEr` function is set to `totL` then total or grand total (if grand total is enabled) can be chosen.

5.89 Serial baud rate

Section:	5Eri
Display:	bAud
Range:	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2
Default Value:	9600
Default Access Level	4
Function number	4484

Allows the baud rate to be set for serial communications. Choices are:

1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2

Baud rates above 9600 are in k Baud.

5.90 Serial parity

Section:	5Eri
Display:	PrtY
Range:	8n, 8E, 8o, 7E, 7o
Default Value:	8n
Default Access Level	4
Function number	4482

Allows selection of the parity check. The parity check selected should match that of the device it is being communicated with. The choices are 8 bit with no parity, even parity or odd parity or 7 bit with even or odd parity.

5.91 Serial address

Section:	5Eri
Display:	Unit Addr
Range:	1 to 127
Default Value:	1
Default Access Level	4
Function number	0430

Allows selection of the unit address when the operation is set for **POLL** mode. The unit address is offset by 32(DECIMAL) to avoid clashing with ACSII special characters, therefore 42 (DECIMAL) or 2A (HEX) would be unit address 10.

5.92 Send error display

Section:	5Eri
Display:	Err diSP
Range:	OFF or On
Default Value:	On
Default Access Level	4
Function number	4483

When set to **On** the selected any error display will be sent via the serial comms. to any connected receiving device or slave display. When sent to **OFF** the error display will not be sent.

5.93   Select number of alarms

Section: AL.CF

Display: AL Cnt

Range: 0, 1, 2, 3, 4, 5, 6, 7, 8

Default Value: 2

Default Access Level 4

Function number   437d

Allows selection of the number of alarms required from 0 (**0**) to 8 (**8**).

5.94   Easy access mode

Section: ACCES

Display: EASY LEUL

Range: NONE, 1, 2, 3, 4, 5, 6, CAL

Default Value: NONE

Default Access Level 5.CAL

Function number   0C00

Allows choice of the access level available when using the easy access method. For example if this function is set to **3** then functions with levels 1, 2 and 3 can be viewed and changed when access to setup functions is made using this method. To access setup functions using the easy access method press and hold the ▣ button until the message **FUNC** is seen followed by the first function message, this should take approximately 3 seconds. If the message **FUNC End** or no response is seen at this point it means that the access level has been set to **NonE** and that access to setup functions has been refused.

5.95   Remote input access mode

Section: ACCES

Display: r.I NP LEUL

Range: NONE, 1, 2, 3, 4, 5, 6, CAL

Default Value: NONE

Default Access Level 5.CAL

Function number   0C01

This function allows choice of the access level available when using the remote input access method. To access setup functions using the remote input access method one of the remote inputs must be set to **ACCSS** and the chosen remote input must be shorted to ground. Press and hold the ▣ button until the message **FUNC** is seen followed by the first function message, this should take approximately 3 seconds. If the message **FUNC End** is seen at this point it means that the access level has been set to **NonE**.

5.96 PIN code 1

Section:	*ACCES*
Display:	*USr.1 PiN*
Range:	*0* to *65535*
Default Value:	*0*
Default Access Level	*S.CAL*
Function number	*0C09*

This function allows choice of the PIN code to be used for PIN code input access method. Associated with the PIN is an access level (see *PiN.1AccS*). If a PIN is not required leave the setting at *0*. If a PIN other than 0 is chosen then this PIN must be entered to gain access to the the selected level.

To access setup functions using the PIN code input access method press then release the **F** button then within 2 seconds press the **▲** and **▼** buttons at the same time. The message *FUNC* is seen followed by the message *CodE*. If the message *FUNC End* is seen at this point it means that the access level has been set to *NonE*. Use the **▲** and **▼** buttons to enter the PIN then press **F** to accept the PIN and proceed to the setup functions.

5.97 PIN code 1 access level

Section:	*ACCES*
Display:	*USr.1 LEUL*
Range:	*NONE*, *1*, *2*, *3*, *4*, *5*, *6*, *CAL*
Default Value:	*NONE*
Default Access Level	*S.CAL*
Function number	*0C02*

This function allows choice of the access level available when using the PIN code 1 input access method. To access setup functions using the PIN code 1 input access method press and hold the **F** button until the message *FUNC* is seen followed by the first function message, this should take approximately 3 seconds. If the message *FUNC End* is seen at this point it means that the access level has been set to *NonE*.

5.98 PIN code 2

Section:	*ACCES*
Display:	*USr.2 PiN*
Range:	*0* to *65535*
Default Value:	*0*
Default Access Level	*S.CAL*
Function number	*0C0A*

This function allows choice of a second PIN code to be used for PIN code input access method. Associated with the PIN is an access level (see *PiN.2AccS*). The second PIN would normally be used to allow a second person to have a higher access to setup functions via a different PIN. If a second PIN is not required leave the setting at *0*. If a PIN other than 0 is chosen then this PIN must be entered to gain access to the the selected level.

To access setup functions using the PIN code input access method press then release the **F** button then within 2 seconds press the **▲** and **▼** buttons at the same time. The message *FUNC* is seen followed by the message *CodE*. If the message *FUNC End* is seen at this point it means that the access level has been set to *NonE*. Use the **▲** and **▼** buttons to enter the PIN then press **F** to accept the PIN and proceed to the setup functions. Ony one *CodE* message will appear even though there can be a second PIN. If the number entered into the *CodE* at this point is the PIN code 1 number then access will be granted to the functions allocated to the first PIN. If the PIN code 2 value is entered then access will be granted to the functions allocated to the second PIN.

5.99 PIN code 2 access level

Section:	ACCES
Display:	USr.2 LEUL
Range:	NONE, 1, 2, 3, 4, 5, 6, CAL
Default Value:	NONE
Default Access Level	5.CAL
Function number	0C03

This function allows choice of the access level available when using the PIN code 2 input access method. To access setup functions using the PIN code 2 input access method press and hold the **F** button until the message **FUNC** is seen followed by the first function message, this should take approximately 3 seconds. If the message **FUNC End** is seen at this point it means that the access level has been set to **NonE**.

5.100 User assignable access 1 function number

Section:	ACCES
Display:	Fn.1 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	5.CAL
Function number	0C10

In addition to being assigned an access level each setup function is assigned an individual function number. This functions and the ones which follow (**Fn.2CodE** etc.) can be used to alter the access level for particular functions. For example if the user wishes to change the access level of the channel 1 display units (function number 43A0) from level 5 to level 1 then the value **43A0** would be entered at this function and the value **3** would be entered at the function which follows. This would then enable the channel 1 display unit functions to be accessed at the lowest access level.

5.101 User assignable access 1 level value

Section:	ACCES
Display:	Fn.1 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, 5.CAL
Default Value:	dFlt
Default Access Level	5.CAL
Function number	0C40

Allows a new access level for the function with the number set in the function to be chosen. If **dFlt** is chosen then the level reverts back to the original default level.

5.102   User assignable access 2 function number

Section:	ACCES
Display:	Fn.2 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C11

This function allows as second function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.103   User assignable access 2 level value

Section:	ACCES
Display:	Fn.2 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C41

Allows a new access level for the function with the number set in the function to be chosen. If **dFlt** is chosen then the level reverts back to the original default level.

5.104   User assignable access 3 function number

Section:	ACCES
Display:	Fn.3 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C12

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.105   User assignable access 3 level value

Section:	ACCES
Display:	Fn.3 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C42

Allows a new access level for the function with the number set in the function to be chosen. If **dFlt** is chosen then the level reverts back to the original default level.

5.106   User assignable access 4 function number

Section:	ACCES
Display:	Fn.4 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	DC13

This function allows as fourth function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.107   User assignable access 4 level value

Section:	ACCES
Display:	Fn.4 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	DC43

Allows a new access level for the function with the number set in the function to be chosen. If **dFlt** is chosen then the level reverts back to the original default level.

5.108   User assignable access 5 function number

Section:	ACCES
Display:	Fn.5 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	DC14

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.109   User assignable access 5 level value

Section:	ACCES
Display:	Fn.5 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	DC44

Allows a new access level for the function with the number set in the function to be chosen. If **dFlt** is chosen then the level reverts back to the original default level.

5.110   User assignable access 6 function number

Section:	$ACCES$
Display:	$Fn.6\ CodE$
Range:	0000 to $FFFF$ hex.
Default Value:	0000
Default Access Level	$S.CAL$
Function number	$OC15$

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.111   User assignable access 6 level value

Section:	$ACCES$
Display:	$Fn.6\ LEUL$
Range:	$dFlt$, $1, 2, 3, 4, 5, 6, CAL, S.CAL$
Default Value:	$dFlt$
Default Access Level	$S.CAL$
Function number	$OC45$

Allows a new access level for the function with the number set in the function to be chosen. If $dFlt$ is chosen then the level reverts back to the original default level.

5.112   User assignable access 7 function number

Section:	$ACCES$
Display:	$Fn.7\ CodE$
Range:	0000 to $FFFF$ hex.
Default Value:	0000
Default Access Level	$S.CAL$
Function number	$OC16$

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.113   User assignable access 7 level value

Section:	$ACCES$
Display:	$Fn.7\ LEUL$
Range:	$dFlt$, $1, 2, 3, 4, 5, 6, CAL, S.CAL$
Default Value:	$dFlt$
Default Access Level	$S.CAL$
Function number	$OC46$

Allows a new access level for the function with the number set in the function to be chosen. If $dFlt$ is chosen then the level reverts back to the original default level.

5.114   User assignable access 8 function number

Section:	ACCES
Display:	Fn.8 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	OC17

This function allows as fourth function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.115   User assignable access 8 level value

Section:	ACCES
Display:	Fn.8 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	OC47

Allows a new access level for the function with the number set in the function to be chosen. If **dFlt** is chosen then the level reverts back to the original default level.

6   Technical specifications

Display: 6 digit 38mm red LED or 5 digit 45mm red LED or 4 digit 57mm or 58mm red LED
                               or 4 or 6 digit 100mm red LED
                               or 4 digit 200mm red LED type
                               High contrast versions 38mm 6 digit, 58mm 4 digit, 100mm 4 or 6 digit and 200mm 4 digit
                               available in red, green, white or amber led.

Input: Link selectable to suit most sensor types. For inductive, AC and square wave inputs
                               the maximum input voltage is 48VDC or RMS with appropriate link settings

Maximum frequency: 100kHz with 50% duty cycle in high frequency mode
                               1 pulse per 3200 seconds to 5kHz 50% duty cycle in low frequency mode
                               If the ⏣⏣⏣⏣⏣⏣ input filter is ⏣⏣ max. frequency is 70Hz

Impedance: 1MΩ in normal mode or 12KΩ in attenuated input mode

Memory Retention: Battery backed totaliser memory

Display Reset: Remote reset and preset inputs with configurable pull up or down input

Ambient Temperature: -10 to 60°C

Humidity: 5 to 95% non condensing

Power supply: 100 and 200mm LED:
                               AC 240 or 110V selectable, 50/60Hz or AC 48/42/32/24 selectable, 50/60Hz or
                               DC isolated wide range 12 to 24V.
                               20mm, 38mm, 45mm, 57 or 58mm LED:
                               AC 240/110V 50/60Hz or AC 24 to 48V 50/60Hz or
                               DC 12 to 48V isolated or DC 24V non isolated
                               Supply type is factory configured

DC output supply: 5, 12 or 18VDC @ 50mA max.
Output (standard):   4 x relays, 1 x Form C, 3 x Form A rated 5A resistive. Programmable N.O. or N.C.
                               RS485 non isolated serial communications

Optional outputs - some options below are available in combination

Extra relays: 4 extra relays, form A
Analog retransmission: Single 4 to 20mA 12 bit or 16 bit versions
                               Single 4-20mA, 0-1VDC or 0-10VDC (user selectable), 16 bit
                               (4-20mA will drive into resistive loads of up to 800Ω)
                               Analog outputs can be configured for retransmission or PI control
Serial communications: RS485 isolated 8 bit (ASCII or Modbus RTU functions 1 and 3)
                               RS232 serial comms. 8 bit (ASCII or Modbus RTU functions 1 and 3)
                               Ethernet, can be used with Modbus TCP
                               Web page optional with Ethernet option
                               USB port, type B

Physical characteristics - see chapter 2

7 Guarantee and service

The product supplied with this manual is guaranteed against faulty workmanship for a period of two years from the date of dispatch.

Our obligation assumed under this guarantee is limited to the replacement of parts which, by our examination, are proved to be defective and have not been misused, carelessly handled, defaced or damaged due to incorrect installation. This guarantee is VOID where the unit has been opened, tampered with or if repairs have been made or attempted by anyone except an authorised representative of the manufacturing company.

Products for attention under guarantee (unless otherwise agreed) must be returned to the manufacturer freight paid and, if accepted for free repair, will be returned to the customers address in Australia free of charge.

When returning the product for service or repair a full description of the fault and the mode of operation used when the product failed must be given. In any event the manufacturer has no other obligation or liability beyond replacement or repair of this product.

Modifications may be made to any existing or future models of the unit as it may deem necessary without incurring any obligation to incorporate such modifications in units previously sold or to which this guarantee may relate.